MAY 1, 1950

American Machinist

McGRAW-HILL PUBLICATION OF METALWORKING PRODUCTION

Biggest Die Truck — see page 2

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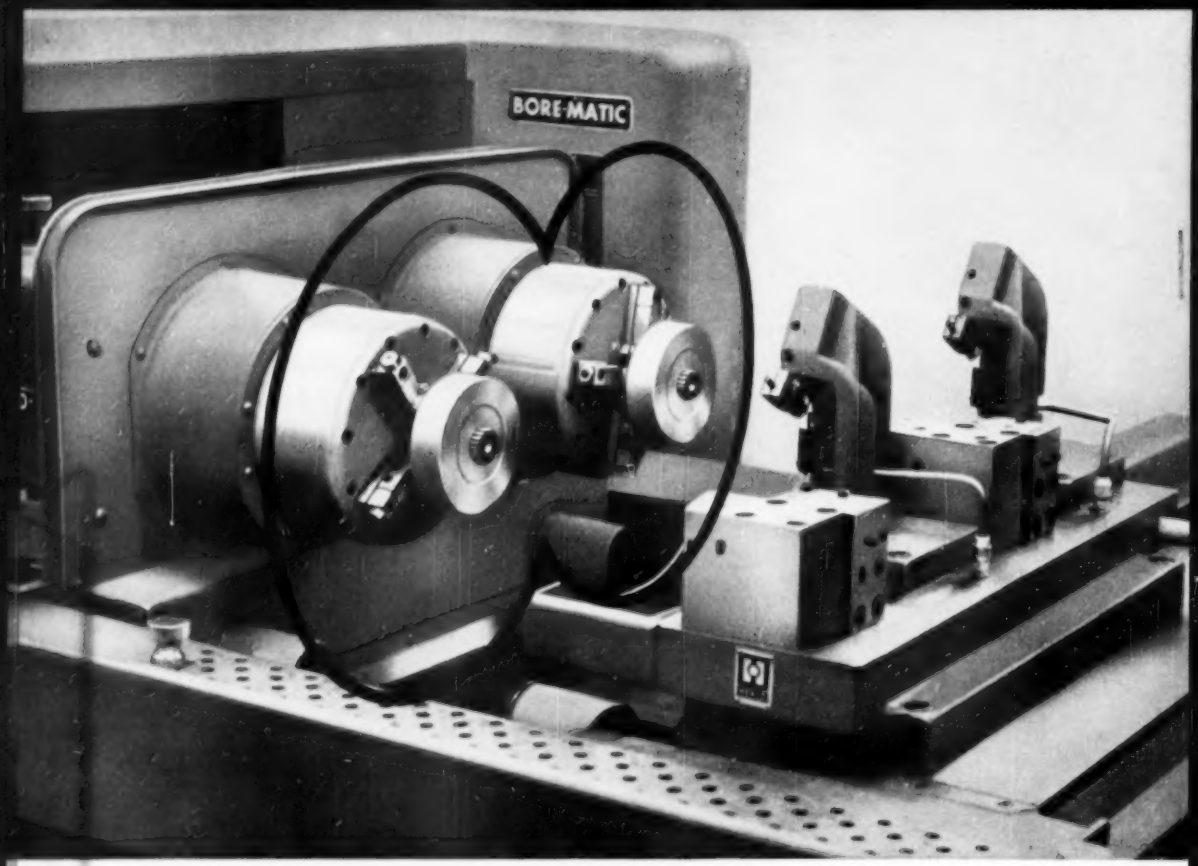
HOW TO MARK YOUR PRODUCTS



two heads are better than one!

The fundamental principle of doing two things at once to increase the amount produced is evidenced every day in Heald equipped factories the world over. Multiplicity of tooling and workholding equipment perform this simple A, B, C arithmetic just as surely as 1+1 equal 2. Naturally the implication is not only that two "heads" are better than one but any combination of multiple arrangements on both single and double end machines can mean increased output, greater savings for you.

New Heald model 321 Bore-Matic doubles production over previous methods

Before this Heald machine was installed, automobile clutch hubs were processed by separate operations on two machines. Now the entire job is done, twice as fast, in a single automatic cycle on the one Heald Model 321 Bore-Matic. The work is mounted on a splined arbor held in an air-operated diaphragm chuck on each boringhead. The O.D. is turned and chamfered and both faces generated by a tool block setup on the table cross slide.

THE HEALD MACHINE COMPANY

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American Machinist

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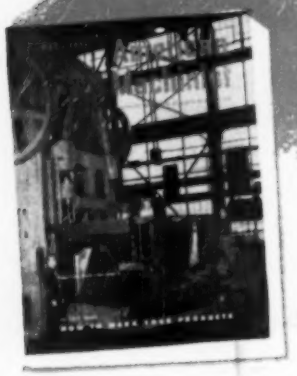


Chips and QUIPS

Strongest . . . Biggest and strongest die-handling truck in the automotive industry is that at the Lansing, Mich., pressed-metal plant of Oldsmobile Division, General Motors. The big battery-powered truck, built by a Chicago firm, can lift a maximum of 55 tons, almost three times its own weight of 20 tons. Here it is Kodachromed, lifting a 1950 model fender-drawing die weighing about 46 tons, into a 525-ton toggle press. The truck takes dies from railroad siding to presses, lifts them hydraulically to press level. Then an overhead crane places the die in the press.

The Kodachrome was taken especially for us by Olds.

Pitchers . . . Continuing our efforts to talk in pictures rather than words wherever possible, this issue includes several picture stories . . . One outlines spinning procedure and equipment clearly . . . Another shows special handling equipment used at C. F. Braun & Co. on the West Coast to lift and carry heavy components . . . A third pictures a special fixture for welding tractor hoods . . . But the gem of our collection is a 3-page "article" on shop uses of hydraulics, in which the usual treatment is replaced by 11 photos and drawings with suitable captions . . . It's all done to save your time in acquiring current information.

Incidentally, picture treatments take much additional time for editors, because they demand complete rewriting and rearrangement of material. They take longer to lay out and style too, because picture areas are less flexible. And when one makes as many drawings as we do, that means still more time and expense. But you save (collectively) far more time than we spend.

Marking . . . Almost a year ago, H. O. Bates of Acromark Co. was so impressed by one of our Special Reports—even on vacation—that he devoted the rest of his free time to putting together all the data he had on marking and marking machines. With that as a basis, Associate Editor Linsley collected material from other makers of equipment and put it all together into our current compact eight pages. We think you'll find it complete and useful, a fitting addition to the more than 100 Reports we've published in the past five years.

Carbides and Automatics . . . Some months ago, we asked C. R. Morgan of the Screw Machine Section, GE, at Pittsfield, Mass., to put down his experiences with carbides on automatic screw machines. He shows how to make carbides worth their cost—by training operators to use 'em effectively. Tool design, setup and servicing are included.

Compact Information . . . Conveyorized assembly of speedometers, estimating hobbing time, and cleaning of copper shells are among compact stories in this issue. The latter two are in our ever-popular Reference Book Sheets.

Management . . . To keep you abreast of latest trends in management, we provide three articles: One, by J. J. Montresor, explains the tailor-made system of quality control that has worked so effectively for Monroe Calculating Machine Company. It is designed for handling small lots, requires few changes in shop routine, and doesn't demand much in the way of statistical records . . . E. C. Neuhaus and G. W. Rada of Hawthorne Works, Western Electric Co., describe a punch-press dial feed that insures good register with high production in making U-shaped springs for central-office phone equipment . . . We also delineate the British apprentice system, in some respects better than ours, and well worth your careful study if you have, or plan to have, a coming executive generation.

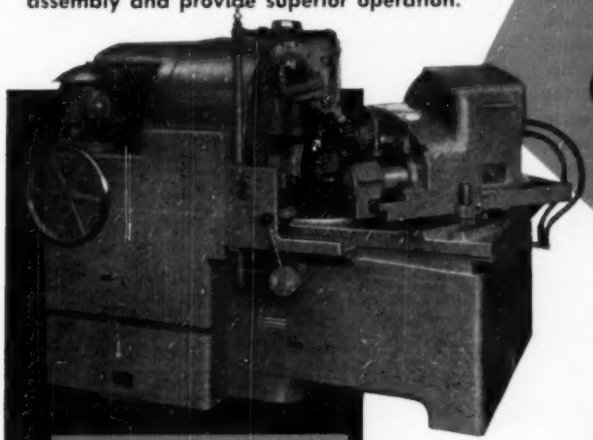
Coming . . . May 15 *AM* will include a Special Report on extrusion of metals. There'll also be a picture presentation of the methods, utilized in making band instruments, principally of brass. Other articles cover methods of figuring cost of machine tools, integral plastic guards, expendable pallets, manufacture of steel wool, Martin's shop-familiarization program for engineers, plus continuation of Dr. Martellotti's series on milling practice.

MILLING RESEARCHER . . . Mario Martellotti was born in Fontana Liri, Italy, and served from 1915-18 in the Italian Army during World War I. He then went back to college, and was graduated from the Royal Polytechnic Institute of Milan, specializing in mechanics, in 1922. He came to the U. S. and went to work in the shops of Cincinnati Milling Machine Company in 1924. One year later, he moved into the Research Dept. where he has been until he assumed responsibility for compiling and editing "A Treatise on Milling and Milling Machines", soon to be published.

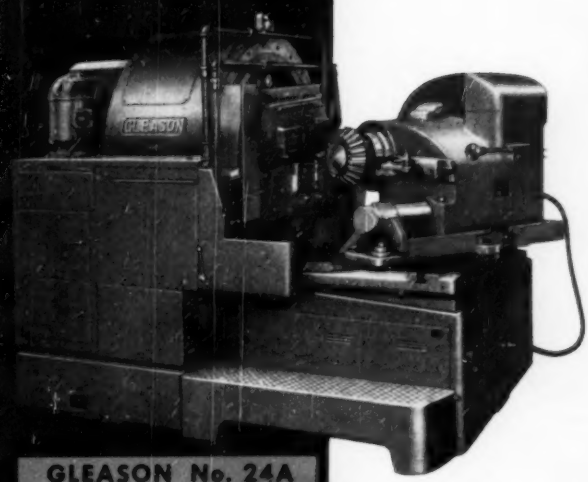
Dr. Martellotti became a naturalized American citizen in 1929, received his doctorate in engineering from his alma mater in 1930. He is a member of the ASME and the ASM, author of many technical papers. Preliminary portions of the milling machine treatise were published in *AM* five years ago; we currently begin publication of later, more-specialized material with "How to Mill Cylindrical Surfaces in the Toolroom".

WHY ARE CONIFLEX GEARS SUPERIOR?

Coniflex* gears, unlike ordinary straight bevels, are relieved at both ends of the teeth. Result: A "flexible" tooth bearing with allowable tolerances to facilitate assembly and provide superior operation.



GLEASON No. 14
STRAIGHT BEVEL GENERATOR



GLEASON No. 24A
STRAIGHT BEVEL GENERATOR

Coniflex* gears can be cut in a large range of sizes. The two machines pictured, the Gleason No. 14 Straight Bevel Generator and the No. 24A Straight Bevel Generator, provide a means of cutting up to 35½".† CONIFLEX* gears, cut on these machines are long-lasting, smoother-operating gears free from the danger of concentration of load on the ends of the teeth.

Write for "Generated Coniflex Gears" for information on the many advantages of Coniflex gears.

†In some cases capacity may be increased. Submit prints for our recommendations.

*Reg. U. S. Pat. Off.

GLEASON Works
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over 85 Years

New Machine Tools...

THE BEST "LOSS-OF-EARNINGS" INSURANCE FOR YOUR SHOP

One of the best ways to prevent shrinkage of earnings is to replace old equipment with new machine tools which operate at lower costs. You can readily determine the time to switch from old to new through a continuing equipment inventory program, sparked by one of the modern replacement formulas. And when you're making a switch in milling machines, you can do no better than to replace with Cincinnatis. One of the Cincinnati lines is illustrated here—the 0-8.

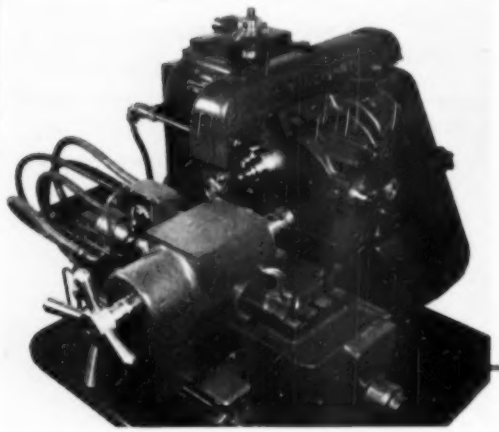
There are four styles of 0-8's:

1) No. 0-8 Plain Automatic
2) No. 0-8 Automatic Rise and Fall
3) No. 0-8 Vertical, conventional table traverse
4) No. 0-8 Vertical, rotary table traverse

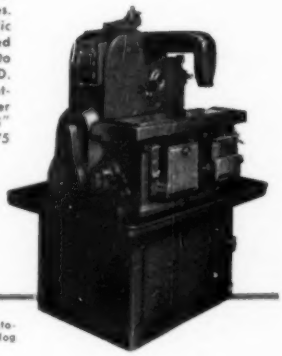
The horizontal style machines have very rapid automatic table cycles, started with one lever. Features include automatic backlash eliminator (for down-milling cuts), and automatic spindle stop (to safeguard the operator). Vertical style 0-8's do not have automatic table cycles, but they can be tooled up for rapid production, as illustrated here; they are equipped with adjustable stops and micrometer adjustment of spindle quill and ram; one man can often run two machines.

A few examples of the type of work handled by these efficient, hard-working machines give you an idea of the way in which they fit into your production schedule. Complete information may be obtained by writing for literature indicated in the brief machine captions.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



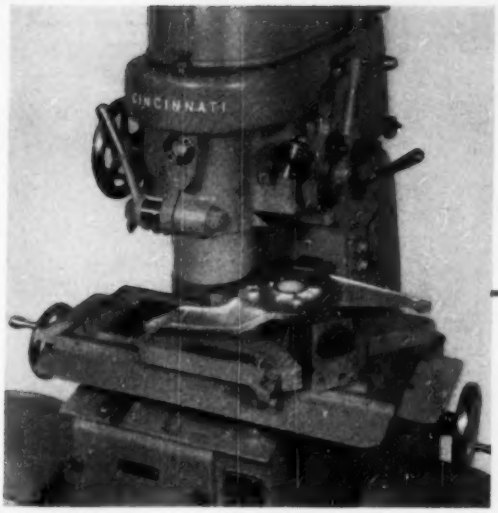
Hydraulic fixtures can readily be applied to CINCINNATI No. 0-8 Automatic Milling Machines. In this example, a hydraulic rotary milling fixture is mounted on the table of an 0-8 Plain, to form mill grooves on the O.D. of two sizes of saw shanks. Cutting speed . . . 300 feet per minute. Feed . . . approx. 15" per minute. Production . . . 175 per hour.



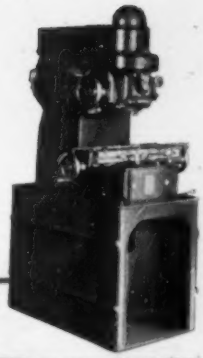
CINCINNATI No. 0-8 Plain Automatic Milling Machine. Catalog No. M-1607.

REPLACE WITH A NEW CINCINNATI

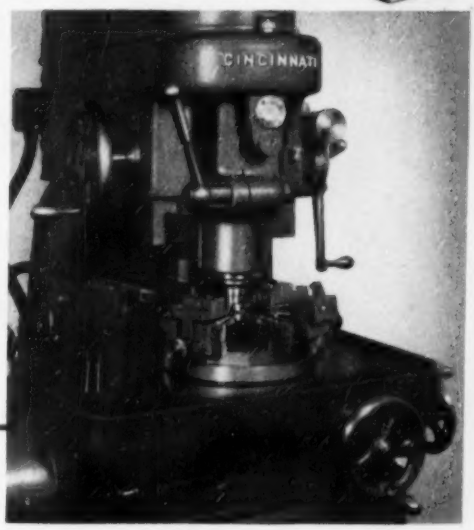
Cincin

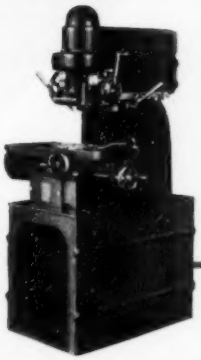


A high speed carbide milling operation on a CINCINNATI No. 0-8 Vertical. The part is an aluminum brake shoe support. Operation . . . mill bottom. Cutting speed . . . 730 feet per minute. Feed . . . 21¾" per minute (special feed rate). Production . . . 120 per hour.



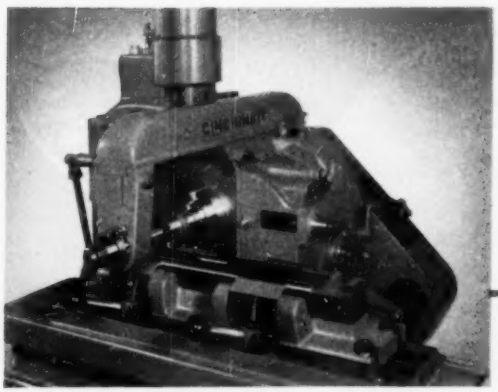
CINCINNATI No. 0-8 Vertical with conventional table feed. Catalog No. M-1532-1.



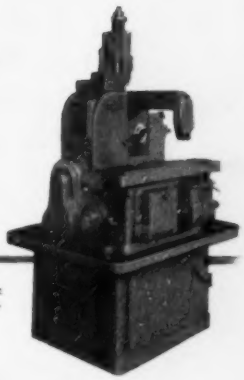


The milled surface does not have to be on the arc of a circle to take advantage of the low-cost possibilities of CINCINNATI 0-8 Verticals with Rotary Table. Here, one of these machines is tooled up for an unusually high production job of milling bevels on the end of firing pins. Cutting speed . . . 620 feet per minute. Feed...1.28 rpm of table. Production...530 per hour.

CINCINNATI No. 0-8 Vertical with Rotary Table Feed. Catalog No. M-1199-2.



Jumping the cutter over obstacles or taking two or more aligned cuts are specialties of CINCINNATI No. 0-8 Rise and Fall Automatics. These characteristics are employed to advantage in milling two keyways in steel shafts. Both keyways are milled in one cycle. Feed . . . spindle carrier and table, 10" per minute. Production . . . 101 per hour.



CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine. Catalog No. M-1607.

CINCINNATI

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MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

A Rack Cutting Attachment having a maximum slide travel up to 12 inches. Cutting is done in both directions.
Face Gear Attachment for "on-center" and "off-center" face gears up to 6¼ inches outside diameter. Also for the serrated teeth or Face Clutches.

GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

Things that can always be done best on the

7-TYPE FELLOWS GEAR SHAPERS*

Gears, of course... internal and external, spur or helical, shoulder gears, cluster gears, segment gears, variable radius gears, etc., in all sizes up to the 7-inch capacity of the machines. Cams, ratchets, sprocket teeth, splines, special shapes... for all such and more, these High-Speed Gear Shapers are a first choice wherever large numbers of parts are to be cut.

Illustrated here are two of many Attachments and Devices by which these machines can be most satisfactorily adapted to special work—at a saving in investment over a single-purpose machine. For data on the 7-series Gear Shapers, and an INFORMATIVE NEW BULLETIN on Special Attachments, write or phone the nearest Fellows Office.

*7-Type 1½-in. maximum cutter stroke.
7A-Type 2 in. maximum stroke and heavier duty.

Fellows

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VERSATILITY

One of the that Produces at Lower

No.

VAN NORMAN

Van Norman Features More Profitable Milling Costs with the

22L Ram Type Miller

The versatility of the Van Norman No. 22L miller enables it to meet the daily fluctuating milling requirements in all types of plant work. It minimizes idle machine time, reduces work re-setups, provides more profitable milling at lower costs.

Here's how — the adjustable cutterhead permits horizontal, angular and vertical milling on one miller. Because setups are minimized, errors that often occur when workpiece is changed are eliminated. Overall milling machine capacity . . . vertical to horizontal . . . is always at peak efficiency.

In addition, front and rear directional controls provide ease of operation . . . reduce operator fatigue . . . increase efficiency. Conveniently located speed and feed selectors permit quick selection of proper speed and feed. Rugged construction throughout assures long operating life. Investigate the Van Norman No. 22L Ram Type Miller for your plant. Write for bulletin.

Important Van Norman Features

• VERSATILITY
Rugged adjustable cutterhead permits horizontal, vertical or angular milling . . . all on ONE machine . . . with standard tooling.

• EASE OF OPERATION
Finger-tip front and rear control of all power feeds. . . . Front and rear 6-way rapid traverse. . . . Large easy-to-read graduated dials. Aluminum alloy arbor supports for easy handling.

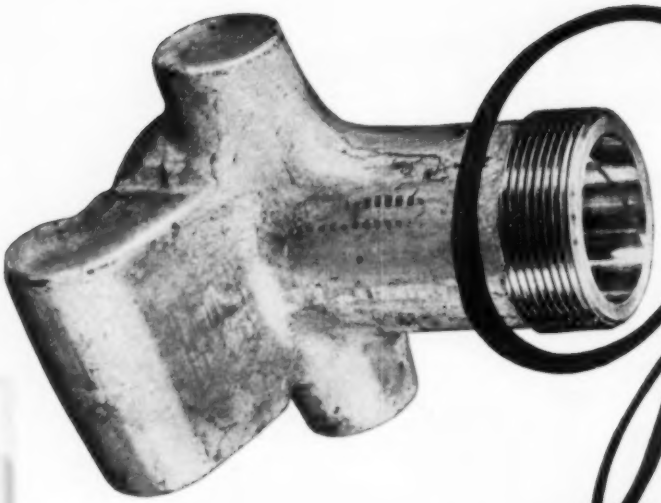
• SIMPLICITY OF CONTROL
All power feed controls are DIRECTIONAL — operate in direction of desired table, saddle and knee movement. . . . Rotary-type feed selector. . . . Convenient and accessible speed selector.

• INCREASED RANGE
Ram adjustment, in and out over column, provides added work range and capacity.

• RIGIDITY AND POWER
Spindle transmission gears are made of hardened alloy steel. . . . Lapped to assure smooth precision operation. . . . Multi-spline shafts operate on taper roller bearings. . . . Rugged column and base. . . . Massive knee.

• LONG LIFE
Precision built. . . . Automatic lubrication.

COMPANY, SPRINGFIELD 7, MASS.



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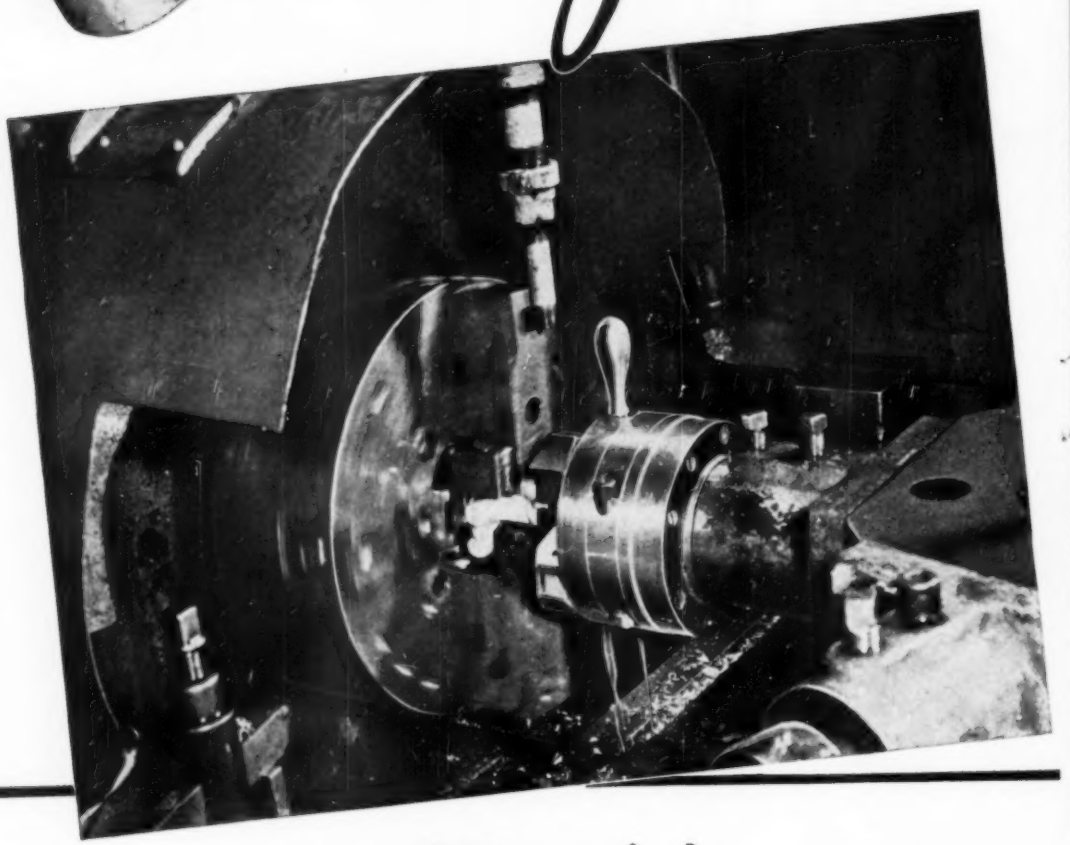


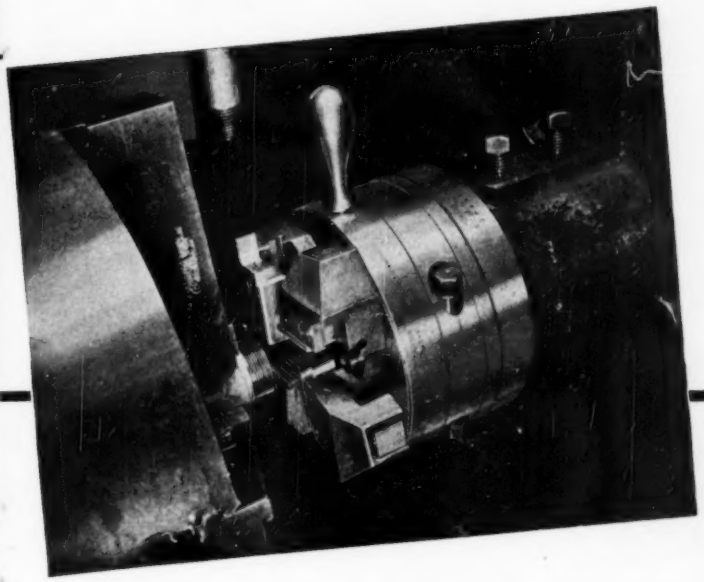
The LANDIS Machine CO.

Lead on Threads

LANDMATIC HEADS

• The permanent nut action of Landis Tangential chasers assures accurate pitch threads throughout on the crown port closing bodies used in bottling machinery. As illustrated, 1 5/8" 16 pitch USS threads are cut 1/2" long on naval bronze forgings. These threads are generated by Landmatic Heads using Landis Tangential Chasers at the rate of 50 SFM. Actual threading time is about 5 seconds.

• The permanent throat feature of the chasers maintains initial cutting accuracy throughout the entire life of the tool. When the chaser is reground, no grinding is done on the throat. Thus the throat angle and nut action is never altered and enables the chaser to consistently produce threads accurate for lead. For further information, on Landis Die Heads & Tangential chasers, write for Bulletins F-80, F-90 & A-50.



These photographs were taken in the Machine Manufacturing Division of the Crown Cork & Seal Company, Inc., Baltimore, Maryland.

LANDIS
TRADE MARK REG. U.S. PAT. OFF.

WAYNESBORO
PENNA. U. S. A.

6 design features of LANDIS TOOL

... that pay off in BETTER PERFORMANCE

Just off the press—a new 26-page catalog describing in detail the LANDIS TOOL 12" Type CH Universal Grinder. Write for your copy today.

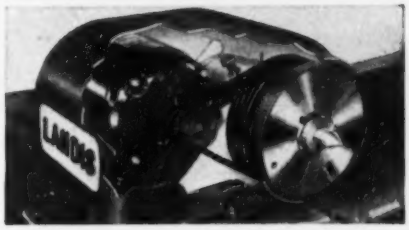
LANDIS TOOL

Precision Grinders

Hydraulic Universal Grinders

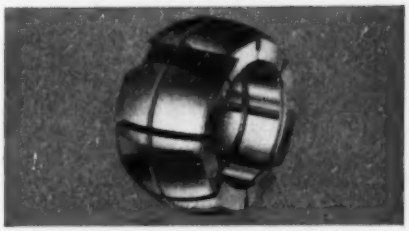
1 EYE-LEVEL WHEEL FEED

Easy to read—easy to see. Operator feeds the wheel and watches grinding action without turning his head. Less fatigue.



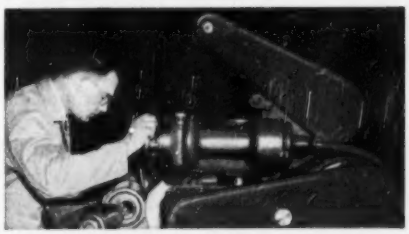
2 VARIABLE SPEED HEADSTOCK

Now you can hit the right work speed on every job for maximum production and quality. Choice of infinite number of speeds within range of machine. Only two revolving parts; the motor spindle and headstock face plate make a simple, compact mechanism.



3 MICROSPHERE WHEEL SPINDLE BEARINGS

Close clearance between spindle and bearing obtained with adjustable Microsphere bearings. Wheel spindle enlarged in diameter between bearings to minimize deflection while grinding. Results in accurate work and quick spark out.

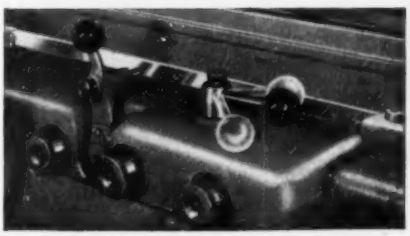


4 SWINGING INTERNAL FIXTURE

With a quick, simple change you can change from external cylindrical grinding to internal grinding. Rigid bracket with belt guarded and in tension at all times.

5 HYDRAULIC OPERATION

LANDIS TOOL hydraulic operation of table traverse and wheel feed gives the smooth power and "velvet touch" that produces fine finishes. Adjustable traverse rate, tarry at reversal and wheel feed, permits quick setup.



6 RAPID HYDRAULIC WHEEL POSITIONING

Wheel positioning by simple lever movement gives big savings where setups are frequent . . . cuts wheel positioning time 50% or more . . . reduces operator fatigue. (Extra equipment)

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

G.&L. Easily Performs

Difficult Internal and

ON OIL REFINERY MAINTENANCE JOBS

Speedy Repairs End Excessive Out-of-Use Losses on Pumps, Heat Exchangers, High Pressure Headers and Similar Parts —Work Remains in Plant for Reconditioning.

Repairing and reconditioning of refinery equipment is greatly simplified by using standard G. & L. Horizontal Boring Machines and attachments. Maintenance work on pumps, headers, heat exchangers and vital replacement parts is quickly performed in the refinery's own machine shop, using this versatile machine tool. It is no longer necessary to send work out with resultant delays in handling, shipping and machining. As a result, the out-of-service interval of refinery components and consequent losses resulting from plant down-time is greatly reduced.

One typical job graphically illustrates how a G. & L. machine is put to excellent use in refinery work. *Here is the story:* The part is a 30 ft. long high-pressure header for a tubular furnace. Placement of the part on the machine table at right angles to the spindle is shown in Figure 1. Twenty-two holes are rebored, grooved and recessed to receive furnace tubes.

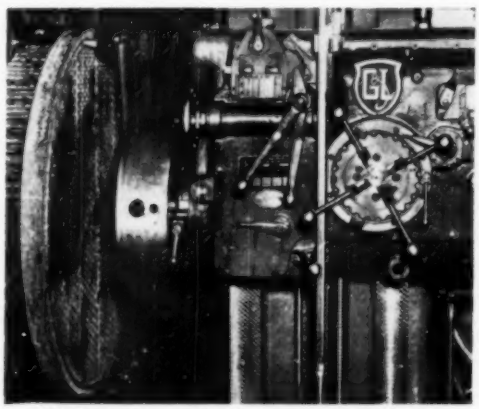
All machining is performed in 17 hours as compared to two weeks originally required to do the job inside the furnace with hand tools. Savings are made not only in overall machining time, but also in getting the tubular furnace in operation days ahead of the former time.

Continuous Feed Facing Head Expands G.&L.'s Machining Range

Internal and external machining operations are rapidly performed on large and awkward fabricated parts when a continuous feed facing head is used. Ordinarily the size of the parts (see illustration 2-3-4) would tax the capacity of any special machines. With a G. & L., however, the problem is reduced to an ordinary run-of-the-plant job and is easily solved.

Removal of the end support permits the machining of the ends of long work pieces, without any machine length limitations.

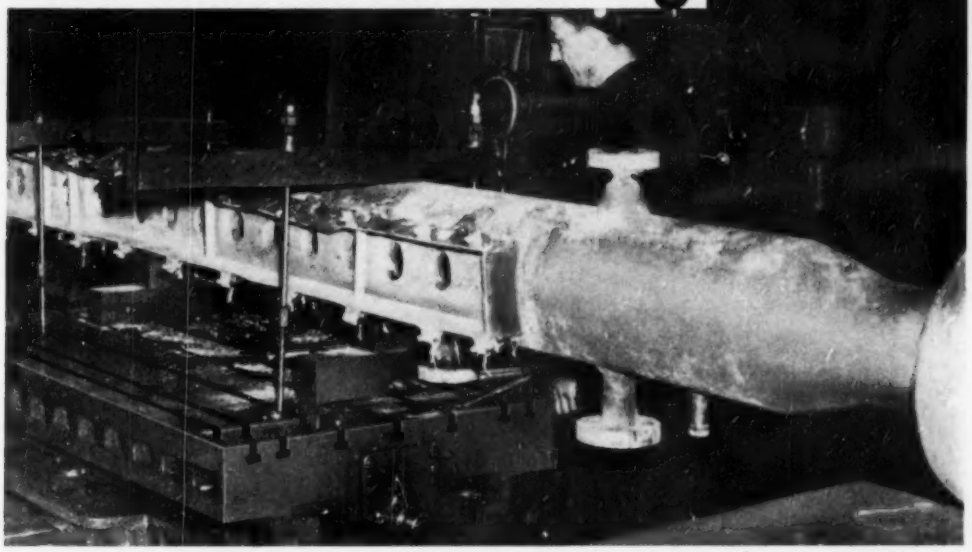
Additional information will be furnished on refinery maintenance work upon request. Or, experienced Giddings & Lewis engineers will gladly consult with you on your specific problems. There is no obligation for such assistance.



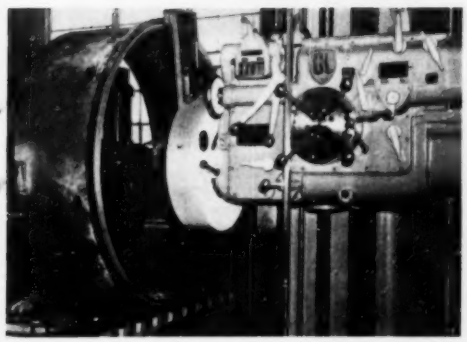
(No. 2.) Long weldments requiring end machining operations are mounted longitudinally. This makes it possible to perform internal and external machining operations after the part is fabricated, resulting in greater machining accuracy.

GIDDINGS & LEWIS
FOND DU LAC

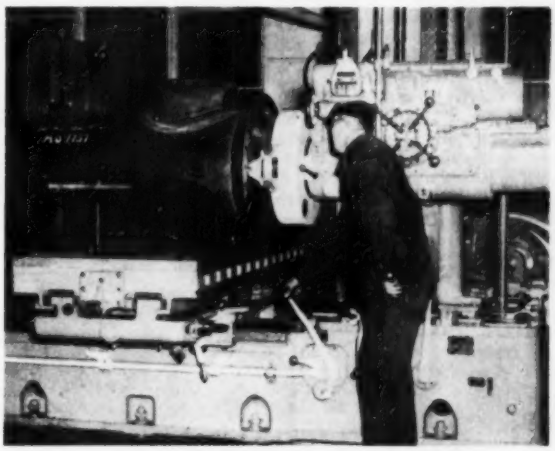
External Machining



(No. 1.) Extending the part laterally or at right angles to the machine spindle readily presents this fabricated steel, high-pressure header to the cutting tool. Furnace tube holes are then easily machined.



(No. 3.) An arm placed on the tool slide of a continuous feed facing head makes it possible to face, turn and back-face occasional jobs of this kind.



(No. 4.) This heat exchanger is mounted longitudinally or parallel to the machine spindle. A free floating hoist supports the outer end of the workpiece to facilitate table and saddle movement.

MACHINE TOOL COMPANY
WISCONSIN U. S. A.

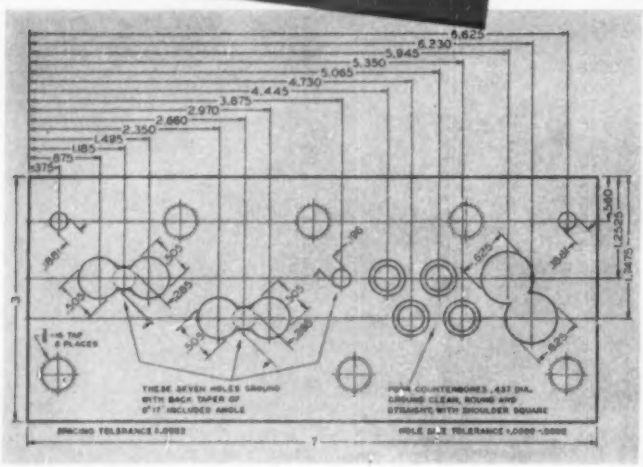
Can you match this in your Shop

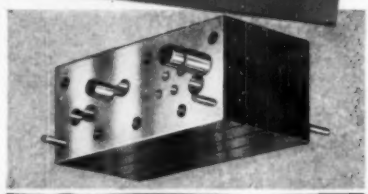
FOR PRECISION?

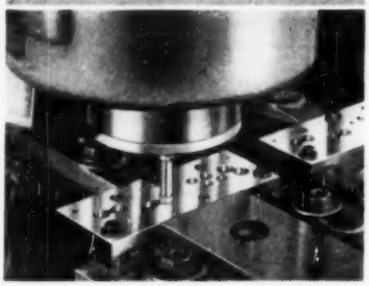
± .0002" for spacing
+ .0000" / − .0002" } for hole size

FOR PRODUCTIVITY?

53% time-saving







Above: Hardened steel dies setup 4 in line. 15 holes ground in each die to tolerance of ±.0002" for spacing; +.0000", −.0002" for hole size. Job completed with 53% time-saving. P&W precision was demonstrated by stacking dies and plugging through with four .0002" undersize plugs. They checked in all 192 possible four-gage combinations.

Bulletin gives complete details on P&W Jig Grinder; send for your copy.

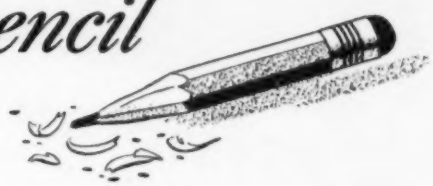
The Pratt & Whitney Vertical Precision Hole Grinder is a *precision* machine, merging all the know-how, skill and craftsmanship acquired during 90 years of designing and building precision equipment. With it, you'll solve untold problems in locating, grinding and checking straight and tapered holes in metal, including hardened steels—to "tenths" accuracy for spacing, diameter and depth. Hole location is by means of the time-proven P&W system of basic end measures, inside micrometers and dial indicators . . . Its ease-of-operation, all 'round versatility, range of spindle speeds to 54,000 rpm are important factors for the *fast* precision grinding of jigs, fixtures, dies, intricate work, and small-lot production parts. The P&W Jig Grinder's time-saving, cost-saving performance makes it a most profitable machine to use. It will strengthen your competitive position.

PRATT & WHITNEY

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

2C ALL-ELECTRIC JIG GRINDER

Always sharpening your pencil



CAN WHITTLE AWAY PROFITS

Every salesman has heard this—"Yes Sir. I want to see you get the business—now you just sharpen that pencil of yours and come up with the right price, and boy, you're in!"

When you sell on that basis it doesn't take long for a 7" pencil to wind up as a 2" stub—with no profits left to buy new pencils.

The right price in any sale is a *fair* price that gives you a *decent profit.*

And the way to arrive at a right price is to *be certain* you have all cost factors down to rock bottom—then add an honest profit—fix the price—*and stay with it.*

If you know your costs are right, your profit margin fair, you may still lose orders—because your competitors may still be falling for the "pencil sharpening" line.

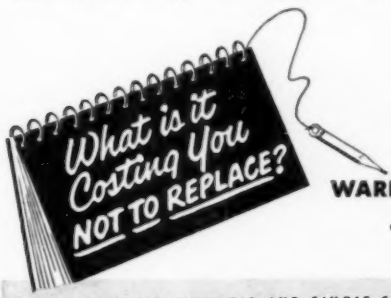
But you won't lose too many—not for long—because your competitors can't *continue* to undersell you—and stay in business.

What has this got to do with machine tools? Just this! If your product is turned out of metal you can't be certain of rock bottom production costs unless you have the best machine tools available to do the work.

And that's where we come in. Warner & Swasey sells one thing—increased production! A Warner & Swasey field representative can study your jobs and methods and tell you *definitely* whether he can cut costs for you by increasing production.

If he can't cut costs for you, *we don't want* an order. If he tells you he can cut costs, then we want the order.

Have you checked lately to learn what new Warner & Swasey Machine Tools can do for you?



WARNER & SWASEY SELLS ONE THING
. . . INCREASED PRODUCTION

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE AND SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

Faster Carbide Grinding...

when you follow the Norton way

Making better products to make other products better

Better Carbide Grinding

The New K Bond CRYSTOLON WHEELS

Faster and freer cutting action, more uniform grinding action—that's what you get with the new Norton K bond. In plant after plant they are reporting lower and lower grinding costs with this new CRYSTOLON wheel.

Vitrified Bond DIAMOND WHEELS

Outstanding for the grinding of single-point tools is the Norton vitrified bonded diamond wheel. Its unique structure gives it a combination of cutting ability and durability far beyond that of any other diamond wheel. Vitrified wheels are also popular in many plants for chip breaker grinding.

Resinoid and Metal Bond DIAMOND WHEELS

For the precision grinding of multi-tooth cutters Norton resinoid bond diamond wheels are the outstanding choice. They are also the first choice for many chip breaker grinding jobs. For cut-off jobs and for some single-point jobs there are Norton metal bond diamond wheels.

NORTON HAS *COMPLETE* CARBIDE GRINDING SERVICE

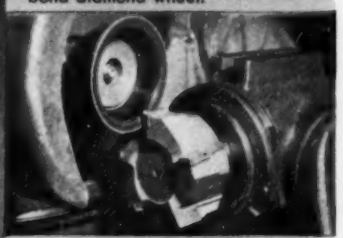
1. Product variety to properly handle every carbide grinding job; 2. expert engineering help the country over; 3. two helpful motion picture films; 4. a 138-page handbook on carbide grinding which will be sent on request—ask for Form 167-G.

NORTON
ABRASIVES

Grinding a single-point carbide tool speedily with the new Norton K bond green CRYSTOLON wheel.

The open structure of this Norton vitrified bond diamond wheel gives a fast, cool cutting action.

Grinding a chip breaker smoothly and quickly with a Norton vitrified bond diamond wheel.



Size is held all around this multi-tooth cutter with a Norton resinoid bond diamond wheel.

W-1294

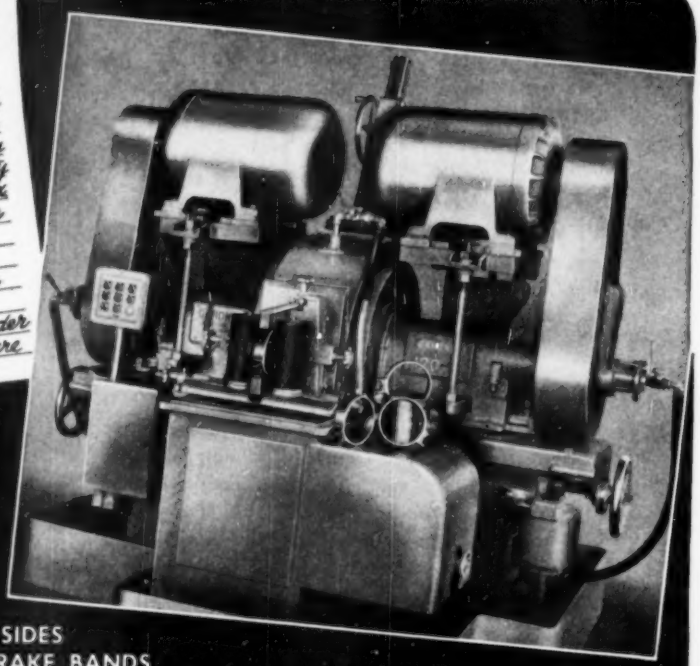
NORTON COMPANY WORCESTER 6, MASS. • Warehouses in Five Cities • Distributors in All Principal Cities

Double GARDNER-GRINDING

. . . the difference between ONE and TWO!

WORK DATA

Part *Transmission Brake Bands*
Material *Malleable Iron*
Operation *Grinding Parallel Sides of Bands*
Tolerances *.002"-.003" Flatness*
.002"-.003" Parallelism
.008"-.010" Uniformity
Stock Removal *.030" Max.*
Production *300 to 350 Pieces Per Hour*
Feed *Feed-Thru With Rubber Rolls*
Machine *No. 120A-26" Gardner Double Grinder With "Feed-Thru" Fixture*



GRINDING PARALLEL SIDES
OF TRANSMISSION BRAKE BANDS
IN ONE PASS THROUGH THE MACHINE

GARDNER-GRIND
Your Two Surfaces

NOTE the close tolerances achieved on the transmission brake bands being ground on the Gardner No. 120A-26" Double Grinder pictured above. Yet . . . both sides are parallel ground at the same time . . . at the rate of 300 to 350 pieces per hour! Gardner Double Grinders, which grind TWO faces at one pass instead of ONE, are often the answer to your parallel-surfacing problems.

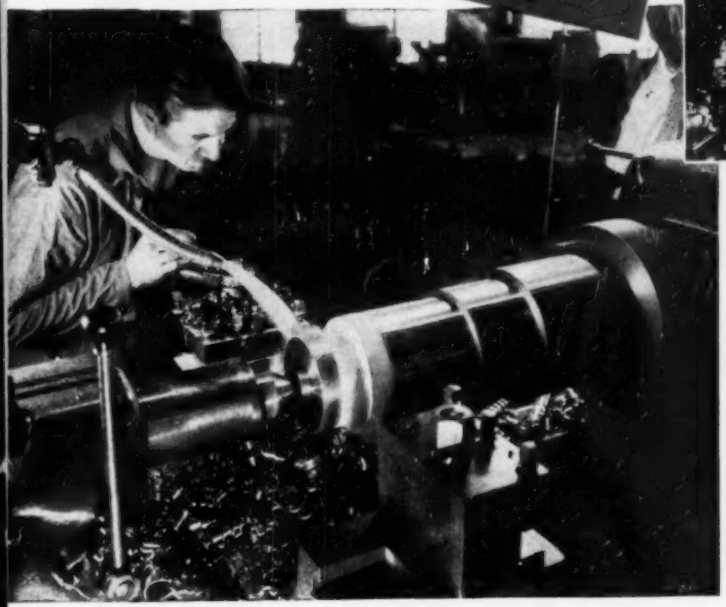
Ask for our DOUBLE-GRINDING Bulletin!

GARDNER MACHINE COMPANY

410 EAST GARDNER STREET . . . . BELOIT, WISCONSIN, U.S.A.

40 H.P. CUT

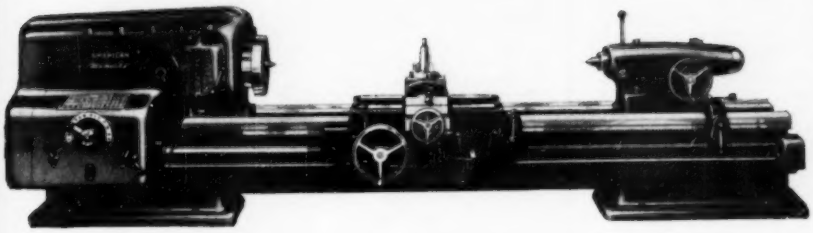
on Main Pin Forgings



The new 25-inch "AMERICAN" Pacemaker Lathe powered with a 40 horse power driving motor is here shown machining Locomotive Main Pins from rough forgings. The cut being taken consumes 40 horse power and the time for the job is 30 minutes, floor to floor.

This is just a sample of what this new lathe will do. It is tremendously powerful and rugged and yet its ease of operation is amazing—finger tip control best describes it. It has speeds for both high speed steel and cemented carbide tools, a wide range of threads and feeds and a massive bed designed for chip disposal at the rear.

For machining axles this new lathe equipped with "AMERICAN" Hydraulic Duplicator is the latest contribution to lower axle costs.



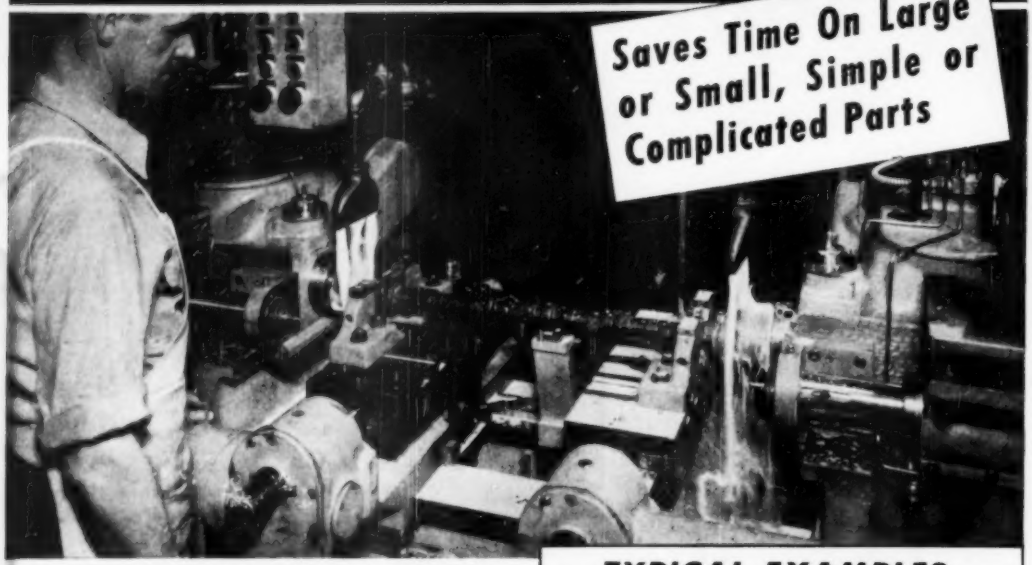
Send for descriptive Bulletin No. 23-A.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Milling To Length and Centering in *ONE OPERATION*...



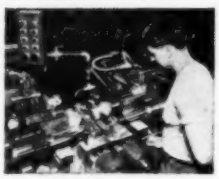
SUNDSTRAND MACHINE HANDLES WIDE RANGE OF WORK IN BOTH LONG AND SHORT RUNS

The Sundstrand machine shown above is milling and centering both ends of a camshaft. Machine is adjustable for handling a range of work from 1″ to 3-1/2″ diameter and 8″ to 48″ long. It has power operated vises and a complete automatic cycle after loading. Other sizes of similar machines for handling work up to 6″ diameter and 84″ long are available. If your work includes milling to length and centering of either big parts or small parts, you will save time and get more accurate work with a Sundstrand Milling and Centering Machine. It saves time, because it mills to length and centers in the same set-up. The work is handled once instead of twice. Extreme accuracy is obtained by performing *both* operations with a single clamping of the part, thereby maintaining a definite relation between the ends and centers. All sizes of machines are flexible and can easily and quickly be adjusted to handle different diameters and lengths of parts, making it profitable to include small as well as large lot sizes.

TYPICAL EXAMPLES

Milling and Centering Both Ends of Short Shafts

Here's an interesting example illustrating how short shafts can be accommodated on this machine. Adjustment of the right hand head for longer parts is simple and fast.

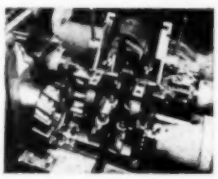


Milling and Centering Both Ends of 32″ Long Camshaft

Adjustment of the right hand head from short to long parts can be made in approximately 20 minutes. Likewise, adjustment of the work holding vises is simple and fast, making it possible to handle work of various diameters.

Milling, Sawing and Centering on Same Machine

In this case one milling cutter is replaced with a saw for cutting off the end of a crankshaft which could not be handled with a conventional milling cutter. Note compact arrangement of vises and spindles.



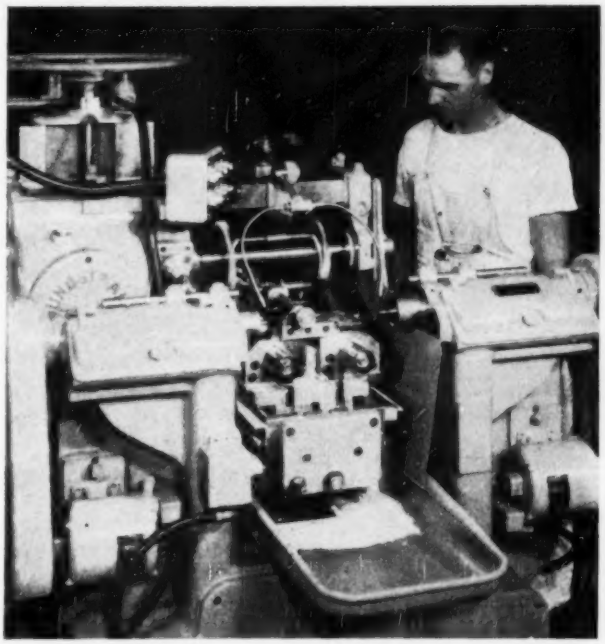
SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

FOR MILLING AND CENTERING SMALL PARTS

This small Sundstrand Milling and Centering Machine is designed to take work from 3″ to 11″ long and from 3/8″ to 1-1/2″ in diameter. It will handle center drills from 13/64″ to 1/2″. It has adjustment for varying milling feeds and speeds and center drill speeds. The machine has a complete automatic cycle except for loading and unloading and is equipped with adjustable power operated quick loading vises.

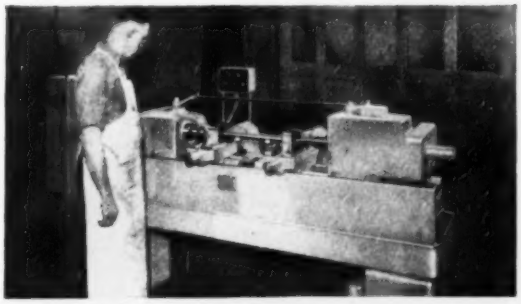
In the set-up shown at the right, the machine mills to length and centers four different sizes of outboard motor crankshafts which range from 7″ to approximately 10-1/2″ in length. Machine is equipped with power operated vises and automatic cycling. Operator merely loads, unloads and starts automatic cycle.



The machine illustrated above mills to length and centers four different sizes of small outboard motor crankshafts which range from 7″ to approximately 10-1/2″ in length. The machine is equipped with power operated vises and automatic cycling so operator's only duties are to load and unload and start the automatic cycle.

FOR DRILLING AND CENTERING ONLY

If your work does not require both milling and centering, here is a machine for centering only. It is a new improved model which is usually furnished with power or hand control. However, it can also be furnished with a combination of power feed and hand operated vises or manual feed and power operated vises. Write for new bulletin covering complete specifications of No. 53A Drilling and Centering Machine.



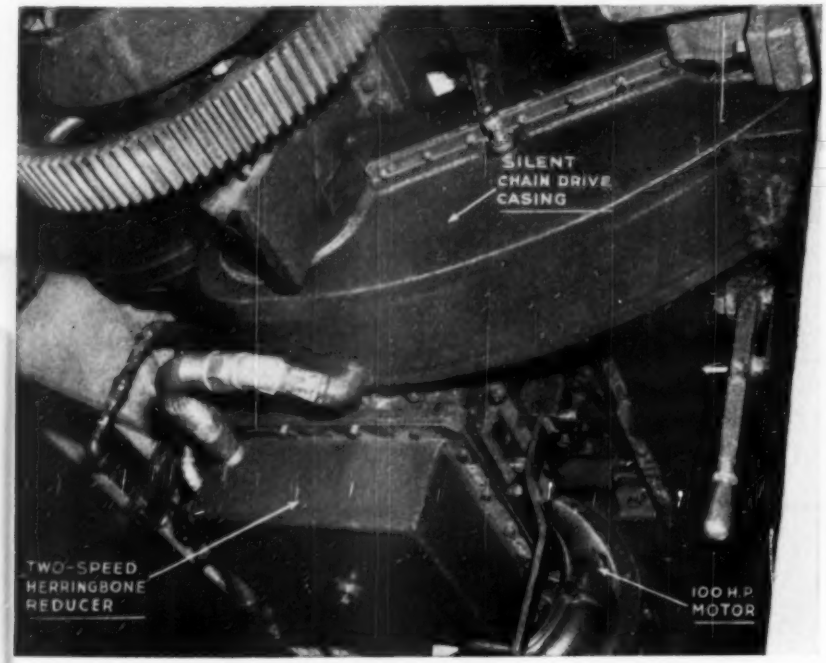
FREE ADDITIONAL DATA Complete data including specifications and machine features are fully described in these bulletins. Write for your copies today. Ask for Bulletins No. 195.

SUNDSTRAND MACHINE TOOL COMPANY

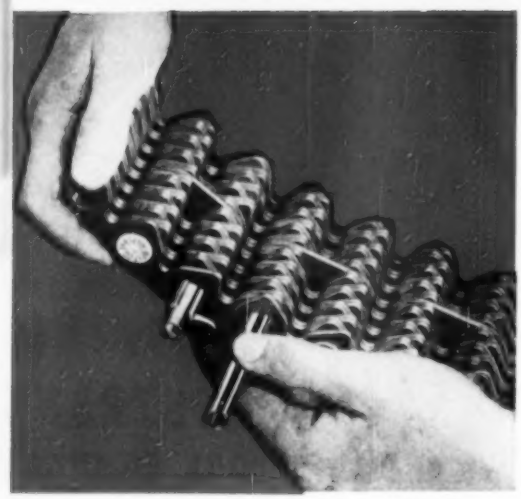
2533 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

LINK-BELT *High Speed*



Link-Belt High-Speed Silent Chain Drive from a 100 HP motor to line shaft of world's fastest newspaper printing press . . . Silent Chain operating in oil-tight casing, runs at 3850 or 4700 feet per minute, the speed being preset through a two-speed gear box.



Link-Belt Silent and Roller Chain Drives are Compact—Save Space

Link-Belt Silent and Roller Chain Drives are Positive—No Slip

Link-Belt Silent and Roller Chain Drives are Shock Absorbing—Not Shock Transmitting

Link-Belt Silent and Roller Chain Drives are Strong—Save Weight

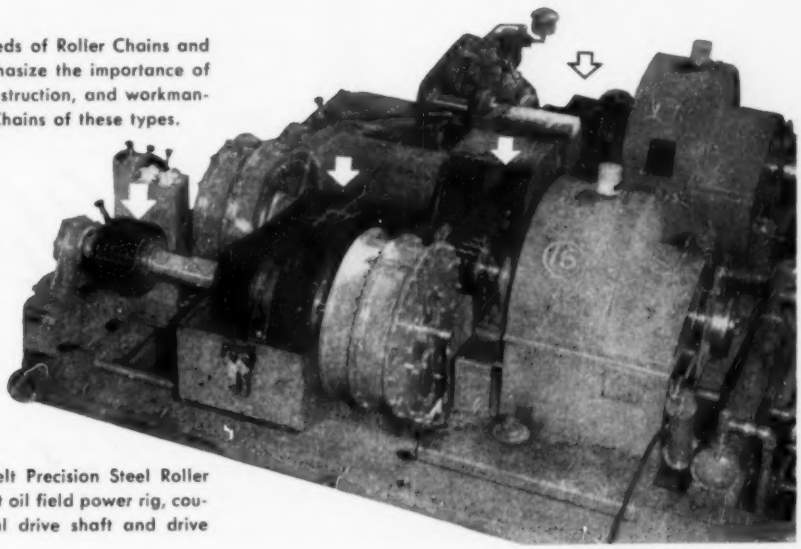
Link-Belt Silverstreak Silent Chain with segmental bushing and round pins insures efficient, long, trouble-free life.

LINK-BELT *Silverstreak*
SILENT CHAIN DRIVES

1910 1920

Positive CHAIN DRIVES

Higher operating speeds of Roller Chains and Silent Chain Drives emphasize the importance of quality of materials, construction, and workmanship found in Link-Belt Chains of these types.



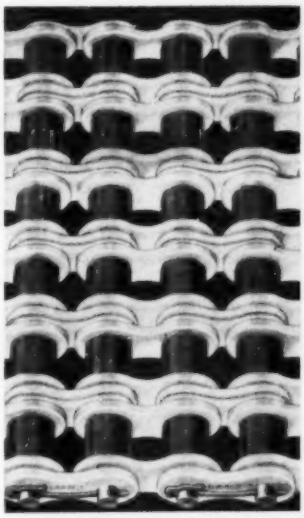
Multiple-width Link-Belt Precision Steel Roller Chains on world's largest oil field power rig, couple two engines to final drive shaft and drive slush pumps.

Link-Belt Precision Steel Roller Chains in sizes from ⅜″ to 2½″ pitch, single and multiple widths, and Silverstreak Silent Chain in sizes ⅜″ to 2″ pitch are available from stock. Hundreds of stock sprocket sizes make stock drives available for most chain drive applications.

A Link-Belt Engineer is near you to serve you.

LINK-BELT COMPANY

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.



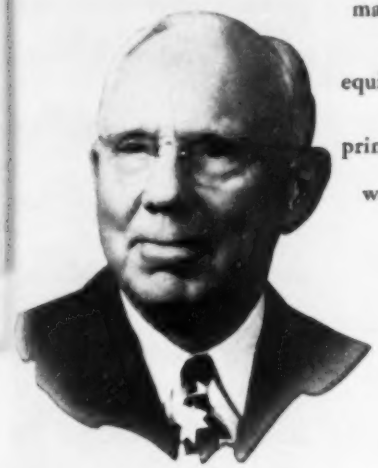
Sextuple width Roller Chain with Shepherd's Crook Cotters designed to resist impact, shock and vibration.

LINK-BELT *Precision Steel*
ROLLER CHAINS AND SPROCKETS

Our First Forty Years...

We are celebrating our Fortieth Anniversary this year with some pride of accomplishment and with a good deal of gratitude to the people who have made this possible.

These include our thousands of friends throughout North America and beyond who have bought our diamonds and diamond products; our many suppliers whose cooperation is so essential, and our company "family" of workers in our several plants and field offices who make, distribute, and service our products.



We have seen this family grow from our original group of three beginners to an organization of nearly two hundred including many outstanding specialists. And, with them, we have graduated through the years from an unheated garage (with practically no equipment) to the most modern of plants and the finest of equipment, much of it exclusive.

Together, we have seen the diamond tool changed from a primitive, handy-man product to a thoroughly scientific tool "engineered to the job" in accordance with the principle which we pioneered forty years ago and developed into recognition throughout industry.

To all of these friends—customers, suppliers, co-workers—our sincere thanks.

WHEEL TRUEING TOOL COMPANY

Harry D. Wallace

President

ROBERT S. FOWLER
First Vice President

HAROLD E. ROBISON
Treasurer

JAMES H. DILLOW
Secretary

DONALD J. WALLACE
Vice President
Manufacturing

HARRY W. WALLACE
Vice President
Diamond Drilling Division

PATRICK ADAMSON
Sales Manager
Diamond Drilling Division

DIAMOND PRODUCTS AND SERVICES

- Diamond Bits for Oil Field Drilling
- Diamond Drill Bits for Mining
- Diamond Reaming Shells
- Prompt Bit Resetting Service
- Complete Stock of Industrial Diamonds
- Tru-Line Diamond Tools
- Single Point Dressing Tools
- The Diamond-Miser
- Radius Forming Diamond Tools
- Diamond Tools for Thread Dressing
- Polished Diamond Contact Points
- Turning and Boring Tools
- Diamond Impregnated Tools
- Diamond Powder
- Special Diamond Tools

Wheel Trueing Plant in Windsor, Ontario

WHEEL TRUEING TOOL COMPANY

Established 1910

3200 West Davison Avenue • Detroit 6, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue
Windsor, Ontario, Canada

THE ADAMANT TOOL COMPANY
(Eastern Division of the Wheel Trueing Tool Co.)
33 West Street, Bloomfield, N. J.

The Adamant Tool Co., Eastern Division: Wheel Trueing Tool Co., Bloomfield, N. J.

DISTRIBUTORS

OIL FIELD DIVISION

DRILLING & SERVICE, INC.
3031 Elm Street, Dallas 1, Texas

OTHER OFFICES—STOCKS—SERVICE

	Shreveport	Odessa	*Lindsay	Casper
Phone:	78627	6774	279	3739

**Car mobile phone through Oklahoma City, Ardmore, Lawton ZF44645*

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Assistant to Vice President, Diamond Drilling Division

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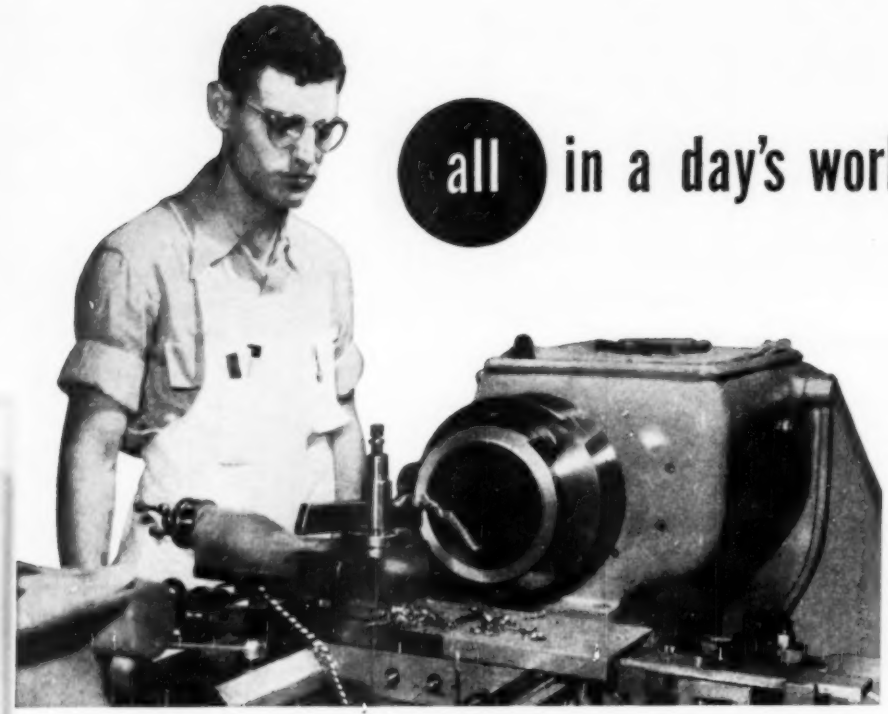
Field Engineer Diamond Drilling Division

LEO CATALLO
Superintendent Diamond Drilling Division

TAD BEMBEN
Plant Engineer

ROBERT F. KENNEDY
Supervision, Diamond Setting

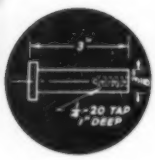
LARRY CARTER
Supervision, Diamond Setting



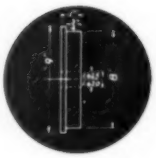
all in a day's work

on the Tray-Top Cintilathe

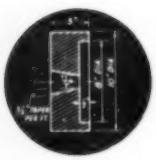
- **Small work diameters, large work diameters**
- **Alloy steels, soft steels, cast irons, non-ferrous metals**
- **Turning, facing, drilling, boring, reaming, threading, tapping**
- **Roughing cuts, finishing cuts**
- **Tools of high speed steel—tools of cemented carbide**



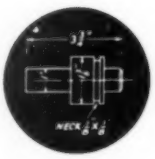
material:	aluminum	
tools:	H.S.S.	
operation	speed	feed
face	1200	.015
turn	1200	.018
ctr. drill	1200	H
drill	1200	H
tap	315	H



material:	CMM 320	
tools:	carbide	
operation	speed	feed
face	608	.018
ctr. drill	1200	H
turn	842	.020
neck	315	H
chamfer	449	H



material:	cast iron	
tools:	carbide	
operation	speed	feed
face	842	.015
turn	842	.018
ctr. drill	842	H
drill 3/8	608	H
drill 1 1/2	161	H
ca-bore	842	.015
taper turn	842	.018



material:	SAE 3150	
tools:	H.S.S.	
operation	speed	feed
face	82	.013
turn	42	.020
ctr. drill	608	H
drill 3/8	608	H
drill 1 1/2	161	H
bore	315	.020
ream	60	H

All demand a wide range of spindle speeds! And Tray-Top is the **only** economy-priced light duty lathe that gives you **twelve speeds — all geared** — in geometrical progression, 40 to 1 overall ratio. Quick, 3-lever speed selection with direct-reading "color match" dial. A choice of three speed ranges: 20 to 820, 30 to 1200, 45 to 1800 rpm . . . Totally enclosed quick change gear box . . . 48 thread and feed changes . . . flame hardened gears in headstock, change gear box and apron . . . convenient "parking space" for tools, etc.—these and many other features make Tray-Tops

OF OUTSTANDING VALUE

Write for Bulletin TEL 100-3.

CINCINNATI LATHE & TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Looking for savings?

NOW, GET TIME-SAVING MONO-LEVER CONTROL ON NEW 3hp MILLING MACHINES

You asked for them — here's one in action — a new 3hp Kearney & Trecker Milling Machine with Mono-Lever Control and Automatic Table Cycle. Savings on this simple form-milling job amounted to 28%!

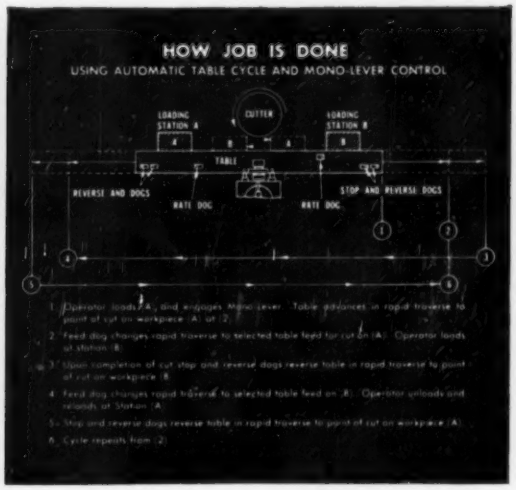

HOW JOB IS DONE
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL
LOADING STATION A
CUTTER
LOADING STATION B
TABLE
REVERSE AND DOGS
RATE DOG
RATE DOG
STOP AND REVERSE DOGS
1. Operator loads A, and engages Mono-Lever. Table advances in rapid traverse to point of cut on workpiece (A) at (2).
2. Feed dog changes rapid traverse to selected table feed for cut on (A). Operator loads at station (B).
3. Upon completion of cut stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (B).
4. Feed dog changes rapid traverse to selected table feed on (B). Operator unloads and reloads at Station (A).
5. Stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (A).
6. Cycle repeats from (2).

Diagram shows how operator set up table for automatic reciprocal milling operation. He engaged the Mono-Lever once for entire run. Machine required no further attention other than loading workpieces.

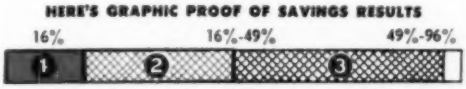
COMPARE

Production by old method.

28%

Production gain using a Kearney & Trecker Milling Machine with Mono-Lever Control and Automatic Table Cycle.

HERE'S GRAPHIC PROOF OF SAVINGS RESULTS



1. The minimum over-all savings reported from any job when done on a Kearney & Trecker Milling Machine with Mono-Lever Control and Automatic Table Cycle.
2. The *majority* of over-all savings from jobs done on these machines fall here.
3. Under favorable conditions, several jobs done on these machines have shown savings like this!

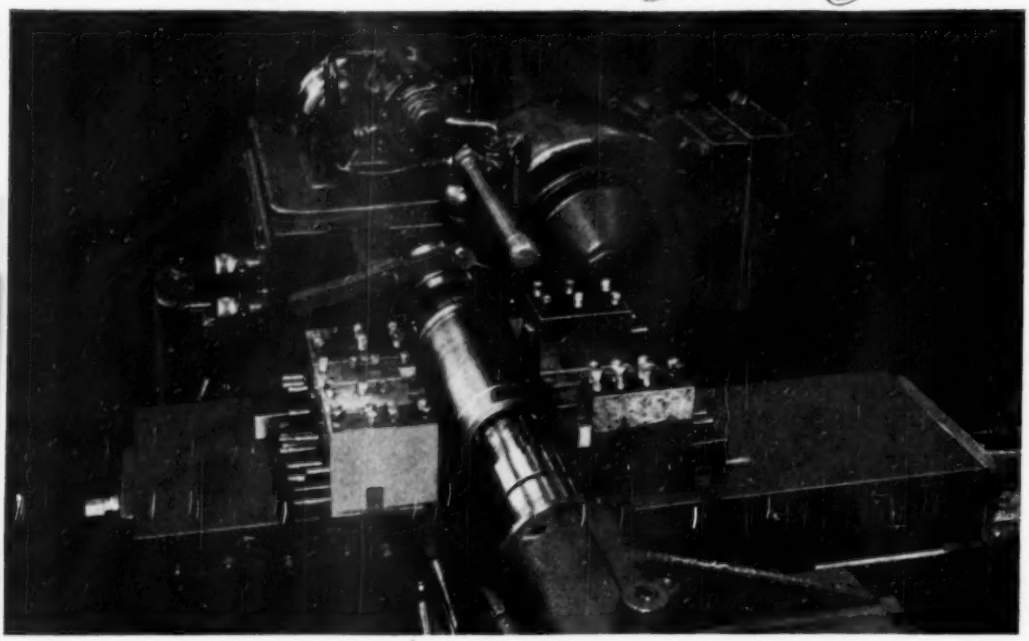
YES, you can now get the proven cost-cutting benefits of Mono-Lever Control and Automatic Table cycle on 4 new 3hp Kearney & Trecker knee-type milling machines.

Exhaustive job tests have shown that savings made possible by Mono-Lever Control and Automatic Table Cycle on larger machines — *are equally available on these new 3hp machines.* That means savings to you of *16% to 96% on most milling operations!*

Contact our nearest representative today. Get the facts on how new Kearney & Trecker Milling Machines with Mono-Lever Control and Automatic Table Cycle return new savings to you. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

CYLINDER LINERS:



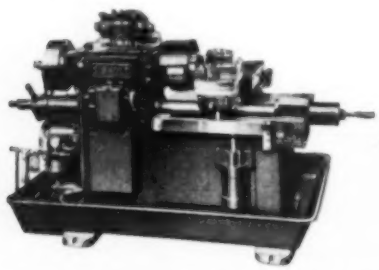
17 different sizes on One Automatic Lathe

THE GISHOLT No. 12 HYDRAULIC

You wouldn't expect an automatic lathe to handle such a wide variety of work as this—unless you know the Gisholt No. 12 Hydraulic.

This versatile automatic lathe handles 17 different sizes of cylinder liners ranging from 6½" to 13" in length and from 3" to 5" in diameter. The work is chucked on expanding arbors with interchangeable pads, while the front and rear tooling is mounted in standard, interchangeable tool blocks. This arrangement provides exceptional flexibility and a facility to quickly change over from one job to another.

When you can handle as many different sizes of parts on *one* automatic lathe—and cut both machining and set-up time—you're *bound* to cut your costs.



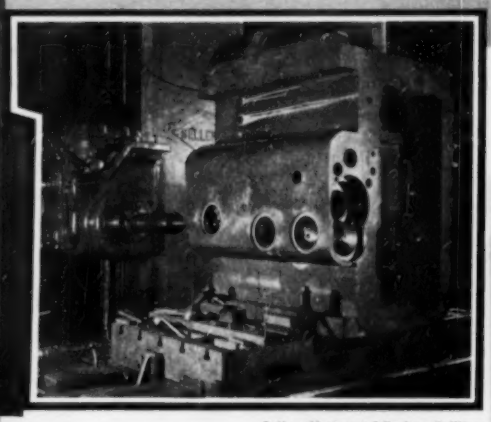
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Gisholt No. 12 Hydraulic Automatic Lathe—a rugged 12" lathe that combines speed and accuracy with easy set-up — unique among automatics.

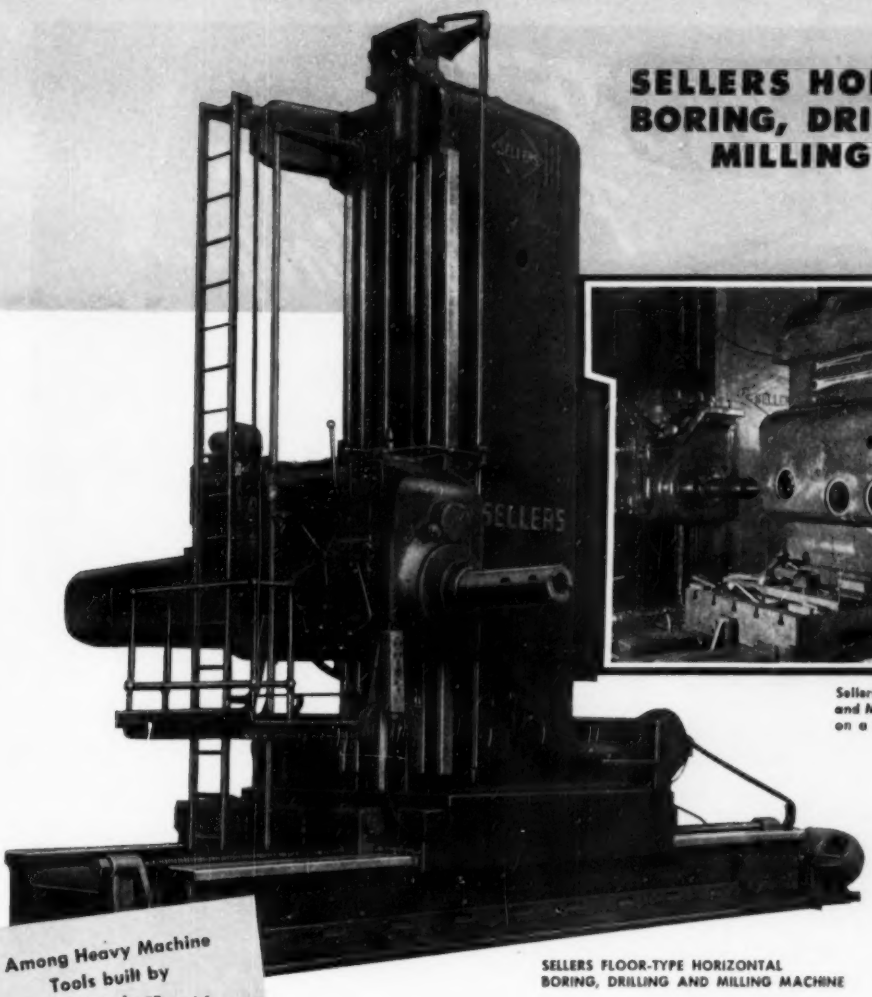
THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

SELLERS HORIZONTAL BORING, DRILLING and MILLING MACHINE



Sellers Horizontal Boring, Drilling and Milling Machine in operation on a heavy machine component



SELLERS FLOOR-TYPE HORIZONTAL
BORING, DRILLING AND MILLING MACHINE

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

A general purpose shop tool for either production or jobbing work, it is carefully engineered to produce better work faster, and at less cost. Built in Floor Type up to 10" spindle diameter and Table Type up to 6" spindle diameter. All controls are centralized on the Unit Head which combines the motor and spindle into a single unit. This Selecto-Control Unit Head makes possible quick, convenient gear change, simplified operation and easy control. The most important value of this machine is to be found in the coordination of all its features.

Full information will be furnished upon request

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

For FASTER Production Milling....

The NEW

MOTCH & MERRYWEATHER

MILLING HEAD

BALANCED SPINDLE, QUILL AND GEAR CONSTRUCTION
ALL GEARS SOLID OR INTEGRAL WITH SHAFTS
MASSIVE STEEL QUILL WITH ADJUSTMENT BY ACME THREAD
HEAVY DUTY, TAPER ROLLER BEARING SUPPORTS
WIDE FACED, HEAVY DUTY HELICAL GEARING
FLYWHEEL ACTION FROM LARGE SOLID DRIVING GEAR
HARDENED, GROUND STEEL WAYS
THESE FEATURES GIVE Rigidity AT THE TOOL POINT!

CAPACITY up to 50 h. p.

Rigidity is needed at the tool point, and the new M. & M. milling head meets this requirement more than amply. Massive, balanced construction prevents vibration, permits heavier cuts and faster feeds, which result in increased production and longer tool life. This new head can be adapted to special production milling machines of our design, which may also combine additional operations into transfer type or trunnion type machines.

Our representative will help you with your problems — no obligation.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY

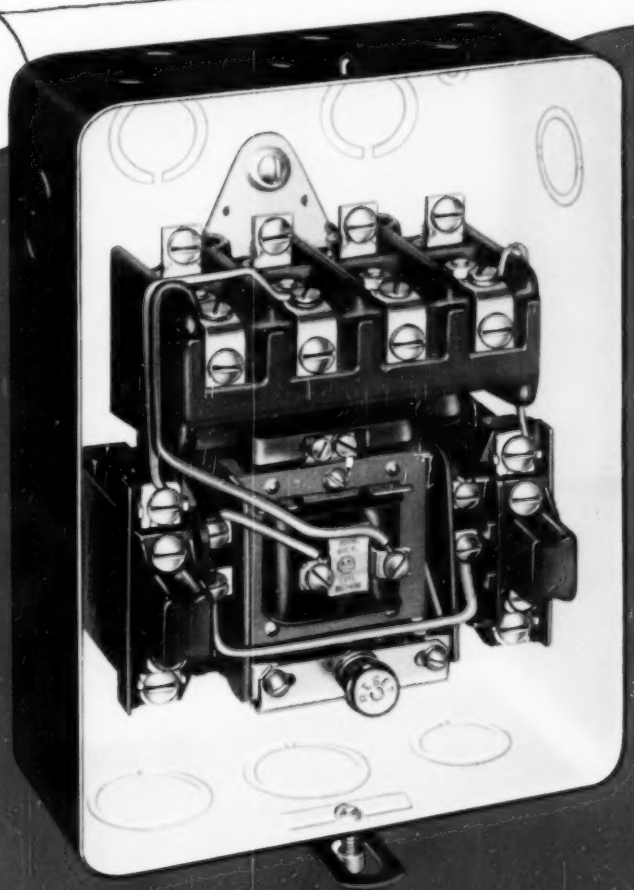
715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

Imitation is the sincerest of flattery

Charles C. Colton



WHY...

do so many starters look like Allen-Bradley Solenoid Starter

• It is no coincidence that most starters, today, look so much like the Allen-Bradley solenoid starter.

There was a time when they did look different. That was before Allen-Bradley brought out the Bulletin 709, Size 1, solenoid starter. It embodied revolutionary features which, today, are established as standard for modern motor controls. That explains why many other starters now resemble Allen-Bradley. But, for simplicity and dependability, Allen-Bradley starters have not been surpassed.

You can reap the benefits of this design leadership by specifying Allen-Bradley motor controls.

ALLEN-BRADLEY CO.
1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY

THE MOST IMITATED MOTOR STARTER

QUALITY

A-B Quality

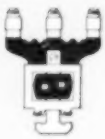
SIMPLICITY—

Only One Moving Part

The Key to the Leadership Position of Allen-Bradley Solenoid Starters—Bulletin 709 starters are trouble free because they have no pivots, pins, bearings, intricate linkages, or flexible shunts. Obviously, the more parts . . . the more chances for trouble.

Simplicity of design is the first requirement of a dependable starter. Enjoy this advantage in your motor controls by specifying Allen-Bradley.

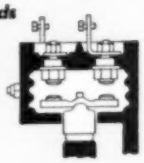
1 **To eliminate trouble-making pins, pivots, etc., you need *Simple Solenoid Action***



The insulating cross bar, carrying the moving contacts of the Allen-Bradley starter, are mounted right on the solenoid plunger. No linkages . . . no pivots or pins.

2 **To get small size and to permit close mounting, you need *Enclosed Arc Hoods***

The solenoid construction, with its straight up and down motion and enclosed contacts, is extremely compact. Units can be mounted close together on panels or in machine bases.

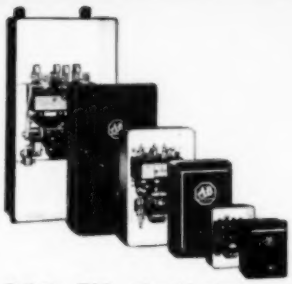


3 **To eliminate contact maintenance, you need *Silver Alloy Contacts***

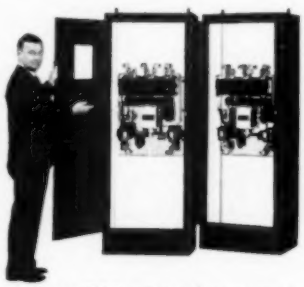
The patented silver alloy contacts, pioneered by Allen-Bradley on Bulletin 709 solenoid starters, have made contact maintenance, such as filing, cleaning, and dressing, unnecessary.

4 **To make panel mounting easy, you need *Unit Construction***

Allen-Bradley also pioneered the self-insulated starter mounted on a metal back plate. Bulletin 709 solenoid starters can be grouped closely on control panels of all types.



Bulletin 709 solenoid starters in Sizes 0 to 5, inclusive, for motors up to 100 hp, 220 v; 200 hp, 440-550-600 v.



Bulletin 709 solenoid starters, in Sizes 6 and 7, for motors up to 300 hp, 220 v; 600 hp, 440-550-600 v.

Ample space is provided for the heavy conductors to line and motor terminals. Allen-Bradley starters are available in enclosures for every service . . . indoor or outdoor.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

A-B Quality

3508

LEHIGH S

A Tool Steel that's engineered for the utmost wear resistance

AS AN EXAMPLE

Lehigh S increased die life from 40 to 50 pct over previous steels used for liner dies to mold refractory brick. In molding high-quality fire brick, highly abrasive in content, the average production is 50,000 brick per die liner . . . with only .001 in. of metal loss due to abrasion under pressure as high as 1500 psi. Press down-time has been reduced because of greater production per grind. Tempered at 350 F, dies have a surface hardness of Rockwell C-64.

Lehigh S is your choice when you need the ultimate in wear-resistance. It assures maximum tool life under extremely abrasive conditions. Lehigh S is the oil-hardening type of high-carbon, high-chrome steel. It has very low distortion during heat-treatment . . . and the highest hardness of all our die steels; it has deep-hardening properties and high compressive strength.

Lehigh S is an old favorite with experienced toolmakers. Over and over again they choose it for tools that blank, cold-trim, and cold form; punches and deep-drawing dies; rotary slitting cutters, forming and bending rolls; shear blades and liner dies.

Give Lehigh S a trial on your jobs where wear-resistance is a big problem. You'll find it's a steel that wears and wears. Get full facts now from our nearest sales office or Bethlehem tool steel distributor.

HEAT-TREATMENT OF LEHIGH S

	C	Cr	V
Typical Analysis:	2.05	11.75	0.60

Annealing: 1625 F, furnace-cool, 241 Brinell
Preheating: 1200 to 1250 F, prior to hardening
Hardening: 1800 F, oil-quench
Tempering: 400 F, for maximum wear
925 F, for greatest shock-resistance
(Rockwell C hardness of 58 to 63)

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bethlehem ULTRASONIC TESTED **Tool Steel**

Now! a better way

Crucible
TOOL STEEL SELECTOR
COPYRIGHT 1949
CUTTING TOOLS
GENERAL PURPOSE
SPECIAL PURPOSE
IMPACT TOOL
GENERAL PURPOSE
MACHINE CUT MOLDS
PLASTIC MOLDING
COLD HOBBED MOLDS
HIGH TEMPERATURE CASTING ALUMINUM & MAGNESIUM ALLOYS
DIE CASTING
LOW TEMPERATURE CASTING ZINC & TIN ALLOYS
SPECIAL PURPOSE
GENERAL PURPOSE
METAL FORMING — COLD
LONG TIME CONTACT WITH HOT METAL
SHORT TIME CONTACT WITH HOT METAL
METAL FORMING — HOT
CHARACTERISTICS
HEAT TREATMENT
Each tool steel application falls in one of six major classes. To select the right tool steel for your application:
1. Select the major class on outer ring which covers application.
2. Select the sub-group which best fits the application.
3. Set arrow on each grade in the sub-group and note its characteristics and typical heat treatment.
4. Select the tool steel which, in your judgment, is required.
☆ Relative for Steels in General
* O — Oil W — Water
A — Air B — Brine
L — Molten (Liquid) Bath
Double-Tempered
Carburized
► Core Hardness
Cold Hubbing — Low C (Fe-100)
· V Heat Treat, Then Nitride at 950 F. Gas Nitriding, 40-50 Hours Will Produce .012-.015 Case
GRADE
AIRDI 150
WEAR RESISTANCE

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS— and you've got the *right* answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!
And you're sure you're right!!

to select tool steels

Get the right answer instantly

The CRUCIBLE TOOL STEEL SELECTOR uses the only *logical* method to select the *right tool steel right from the start!* Your own experience tells you that the *application* should dictate the choice of the tool steel...and Crucible has applied 50 years of tool steel leadership to adapt this idea to the simplest, handiest instrument you've ever used—the Crucible Tool Steel Selector. Put an end to costly trial and error tool steel selection. When you're tooling up, a turn of the Selector gives you the *right answer*—instantly.

Satisfactory in every case

Now you can start with the application, and the answer you get from the Selector will prove satisfactory in every case, for the Crucible Tool Steel Selector covers 22 Tool Steels which fit 98% of all Tool Steel applications. You no longer need to start with a steel of known characteristics and back your judgment with a costly trial experiment.

And here's an important production point! ALL the tool steels on the Crucible Tool Steel Selector are in warehouse stock . . . that means when you get the answer, you can get the steel . . . fast!

Send for your selector today

You'll want the CRUCIBLE TOOL STEEL SELECTOR . . . and we want you to have it! Remember—nothing you've seen before approaches your tool steel problems so simply and logically!

Crucible Steel Company of America
Dept. A, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name_____ Title_____

Company_____

Street_____

City_____ State_____

mail this now

CRUCIBLE first name in special purpose steels

TOOL STEELS

fifty years of Fine steelmaking

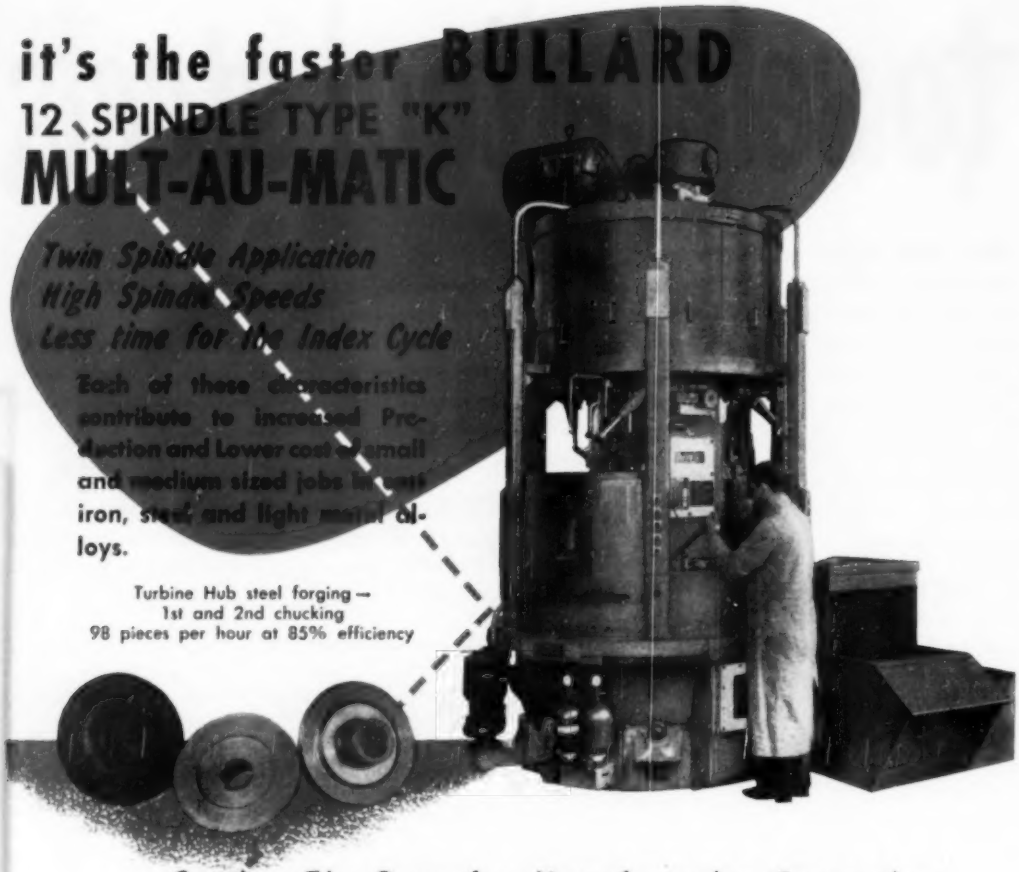
Branch Offices and Warehouses: ATLANTA · BALTIMORE · BOSTON · BUFFALO · CHARLOTTE · CHICAGO · CINCINNATI · CLEVELAND · DENVER DETROIT · HOUSTON, TEXAS · INDIANAPOLIS · LOS ANGELES · MILWAUKEE · NEWARK · NEW HAVEN · NEW YORK · PHILADELPHIA · PITTSBURGH PROVIDENCE · ROCKFORD · SAN FRANCISCO · SEATTLE · SPRINGFIELD, MASS. · ST. LOUIS · SYRACUSE · TORONTO, ONT. · WASHINGTON, D. C.

it's the faster BULLARD
12 SPINDLE TYPE "K"
MULT-AU-MATIC

Twin Spindle Application
High Spindle Speeds
Less time for the Index Cycle

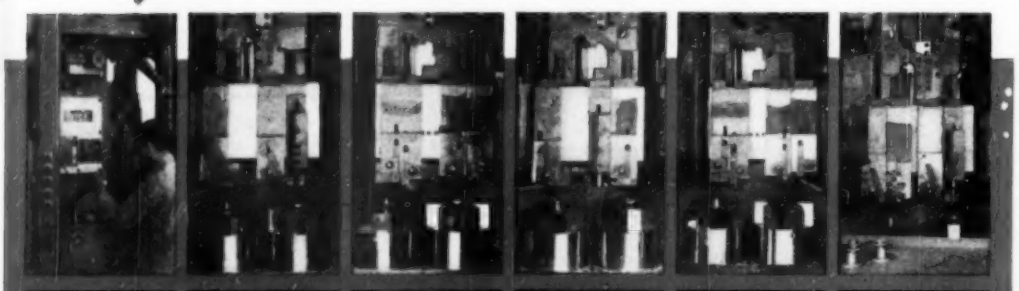
Each of these characteristics contribute to increased Production and Lower cost on small and medium sized jobs in cast iron, steel and light metal alloys.

Turbine Hub steel forging —
1st and 2nd chucking
98 pieces per hour at 85% efficiency



Setting The Pace for Manufacturing Economies

There are 19 operations combined in the 1st and 2nd chuckings. Each index of the machine delivers a finished piece. When writing for information refer to ad XK



THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

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UNIFORMITY of density and hardness
POSITIVE ADHESION of wheels to spindles
PRECISE SHAPE, SIZE and **TRUTH**

Available in a wide range of shapes, sizes & specifications.

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Distributors — All Principal Cities

This new handbook catalog is full of valuable data. We will be glad to send it on your request.

BAY STATE®

To Bay State Abrasive Products Co., Westboro, Mass.
Please send your new mounted wheel, mounted point catalog.

Company.....

Street.....

City.....State.....

Individual.....

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Tomorrow's

Westinghouse

*Life-Line*starter

TOMORROW'S STARTER—*TODAY!*

Uniform Design
in NEMA Sizes
0 through 4
.. to 100 hp, 600 volts

Starter, TODAY!

New Westinghouse *Life-Line*starter*

FOR BETTER MOTOR PROTECTION . . . LOWER OPERATING COSTS

This all-new line of a-c motor starters is announced *only after* 6 years' actual trial service, backed by 40 years of user experience in building motor controls.

HERE'S WHY it IS tomorrow's starter, TODAY:

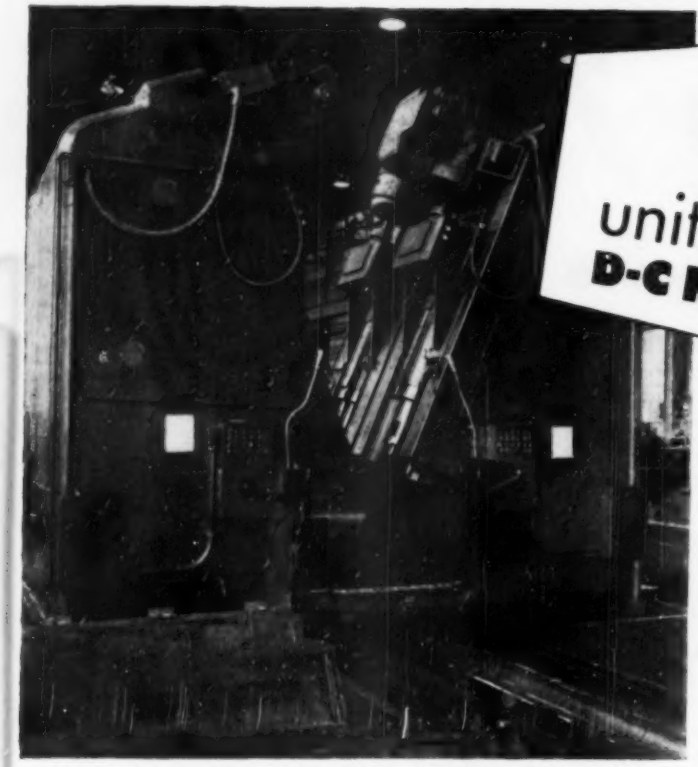
- **Eliminates Solenoid Friction and Misalignment**—Inverted clapper-type magnet balanced on knife-edge.
- **Prevents Accidental Opening or Closing of Contacts**—Seesaw balance of clapper prevents accidental opening—kickout spring prevents accidental closing.
- **Provides Uniform Line**—Appearance and construction, NEMA sizes 0 through 4.
- **Provides Positive Opening of Contacts**—Kickout spring provides force to open contacts.
- **Provides Straight-through Wiring**—Three line leads at top; three load leads at bottom.
- **Provides Positive and Precise Overload Protection**—Snap action bi-metal DISC instead of "solder pots" or bi-metal strips.
- **Permits Front-removal of ALL Parts**—No special tools required.
- **Corrosion-resistant Parts All Plated**—Enclosure Bonderized.
- **Meets NEMA Standard Mountings.**
- **Gives Quietest Operation**—Self-aligning magnet construction.

J-30019

*Trade Mark

See for yourself. Ask your Westinghouse representative to show you "the inside story"—a Trans-Vision presentation of the Life-Linestarter. Get the facts. Write for 20-page complete line booklet, B-4677. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

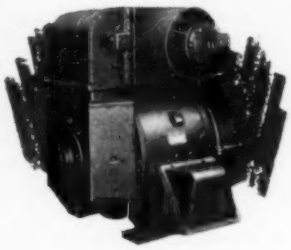
save installation cost



G-E unit-cooled motors keep on the job on this diesel-engine cylinder-boring machine.

unit-cooled D-C MOTORS

2 types to meet your needs



SINGLE-BLOWER TYPE—
for normal speeds has shaft-driven fan to circulate internal air, and separate motor-driven blower for external air.

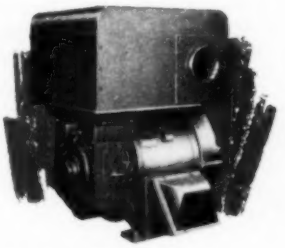
Here's Protected Power For Harmful Atmospheres . . . Unit-Cooled D-C Motors From 15 to 200 Hp

G-E unit-cooled motors eliminate need for pipes, ducts, or external cooling systems.

Easy maintenance! Special heat-exchanger and ventilating system keep airborne particles out of the motor. Large end-shield openings provide easy access to commutator brushes and brush rigging.

Flexibility! You can interchange these motors easily with G-E open motors, because they have the same mounting dimensions.

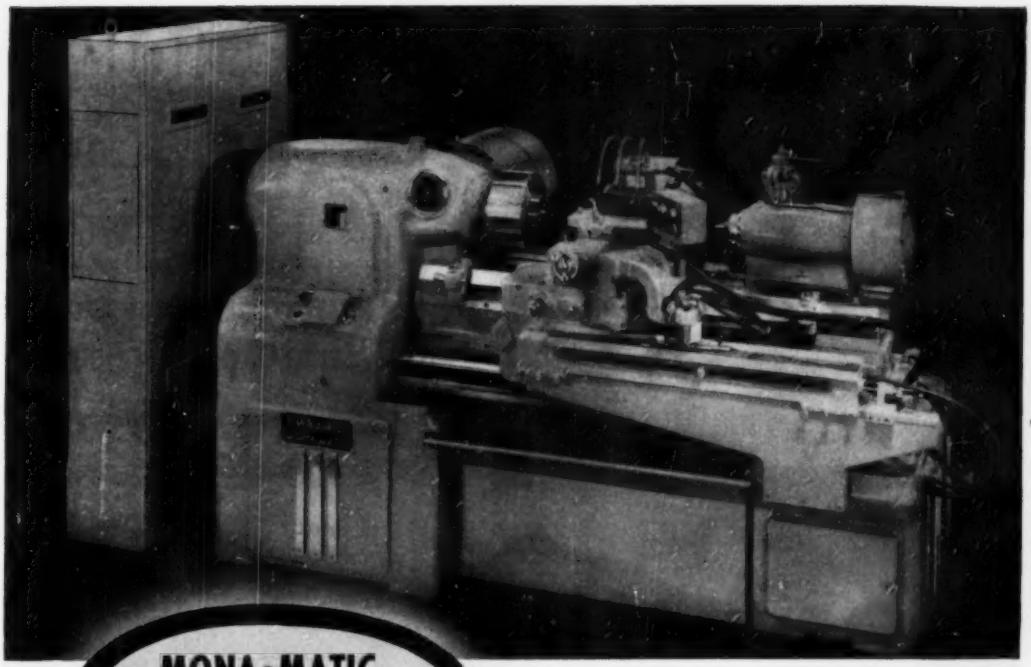
You can buy G-E unit-cooled motors from 15 to 200 hp, for constant or adjustable speed. Ask your G-E representative or write for Bulletin GEA-4469. Apparatus Department, General Electric Company, Schenectady 5, New York.



DOUBLE-BLOWER TYPE—
can be operated continuously at very low speeds without harmful overheating. Auxiliary induction motor drives blowers for internal and external air.

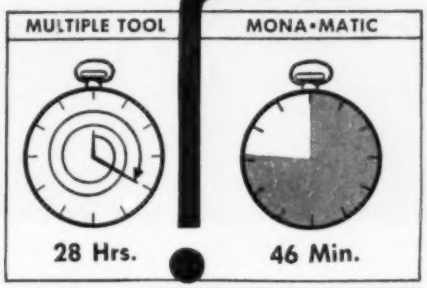
GENERAL ELECTRIC

730-20



MONA•MATIC or Multiple Tooling Methods ..WHICH?

LET'S TALK SETUP TIME!



	Multiple Tool Automatics (Battery of Four)	Mona-Matics (Battery of Two)
Production	120/hour	160/hour
Cutting Tools	Cemented Carbide	Cemented Carbide
No. of Tools	40	4
Cost of Tools (including one replacement set)	$4220	$187
Setup Time	**28-30 hours**	**46 minutes**
Total Horsepower	80-120	40
Floor Space	150-200% more than Mona-Matics	
Subsequent Grinding Operations		50% less time than multiple tool

Would you rather spend *forty-six minutes* or *twenty-eight hours* tooling up for this production job? It's just as simple as that.

On the typical steering knuckle job detailed at the left, total setup time (four tools) on the two Mona-Matics is only forty-six minutes. The battery of *four* multiple tool automatics requires a total setup time of twenty-eight to thirty hours (forty tools)! And that does not include tool grinding, which takes many additional hours.

But bear in mind that reduced setup time is not the whole story of the Mona-Matic's outstanding ability to cut your costs. You'll save on production time, on tooling costs, on accuracy, on power consumption and on floor space, too. For the full facts on how Monarch's famous Mona-Matics will outperform any ordinary multiple tool machining method, write for Bulletin 1804.

COMPARATIVE CASE STUDY

Part—Steering Knuckle.

SAE 1045, turned section—5 3/8" long, 3/4" to 3" diameter

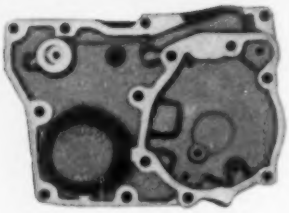
ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

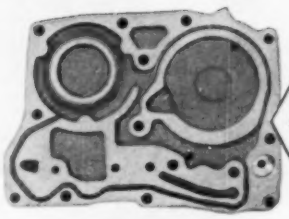
THE MONARCH MACHINE TOOL CO. Sidney, Ohio

2700 OPERATIONS PER HOUR

Drilling, Reaming, Rough & Finish Counterboring, Chamfering, Spotfacing & Tapping

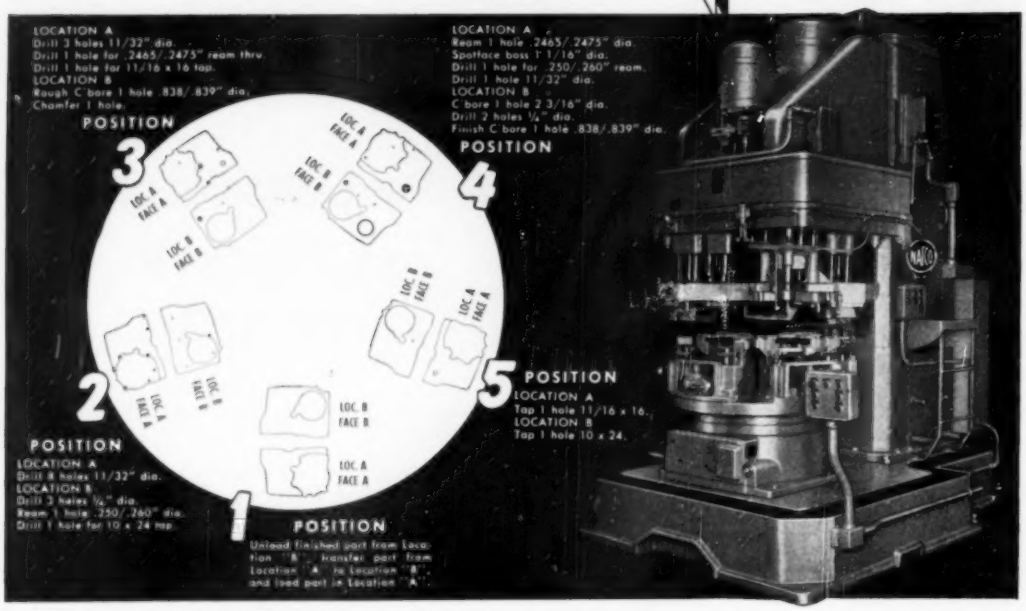


FACE A



FACE B

Producing 90 Automatic Transmission Servo Covers Per Hour


LOCATION A
Drill 3 holes 11/32" dia.
Drill 1 hole for .2465/.2475" ream thru.
Drill 1 hole for 11/16 x 16 tap.
LOCATION B
Rough C'bore 1 hole .838/.839" dia.
Chamfer 1 hole.
POSITION 3
LOCATION A
Ream 1 hole .2465/.2475" dia.
Spotface boss 1 1/16" dia.
Drill 1 hole for .250/.260" ream.
Drill 1 hole 11/32" dia.
LOCATION B
C'bore 1 hole 2 3/16" dia.
Drill 2 holes ¼" dia.
Finish C'bore 1 hole .838/.839" dia.
POSITION 4
POSITION 5
LOCATION A
Tap 1 hole 11/16 x 16.
LOCATION B
Tap 1 hole 10 x 24.
POSITION 2
LOCATION A
Drill 8 holes 11/32" dia.
LOCATION B
Drill 3 holes ½" dia.
Ream 1 hole .250/.260" dia.
Drill 1 hole for 10 x 24 tap.
POSITION 1
Unload finished part from Location "B", transfer part from Location "A" to Location "B", and load part in Location "A".
LOC. A FACE A
LOC. B FACE B

Write today for NATCO—National Cash Register Co. "Success Story" No. 4

NATCO DRILLING, BORING, TAPPING AND FACING MACHINES

Dept. AM

THIS NEW MULTI-OPERATION NATCO HOLESTEEL MACHINE performing automatic machining operations at each of four positions simultaneously is one of many NATCO machines contributing to lower costs. Send us your drilling, boring, tapping and facing problems . . . our engineers have the solution.

NATCO

Call a Natco Field Engineer

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.

Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

BARBER-COLMAN **HEAVY-CUT** *Reamers*

RIGHT OR LEFT HAND SPIRAL

FOR

HEAVY STOCK REMOVAL

FREE CUTTING ACTION

CORE REAMING

FINAL FINISHING AND SIZING

THIS NEW DESIGN OFFERS GREATER END CUTTING, STRENGTH AND BLADE SUPPORT.

* * * * *

NEW 2° WEDGE, WITH BLADES PIN-MOUNTED IN BACK, PROVIDES CUTTING ACTION EQUIVALENT TO SOLID DESIGN.

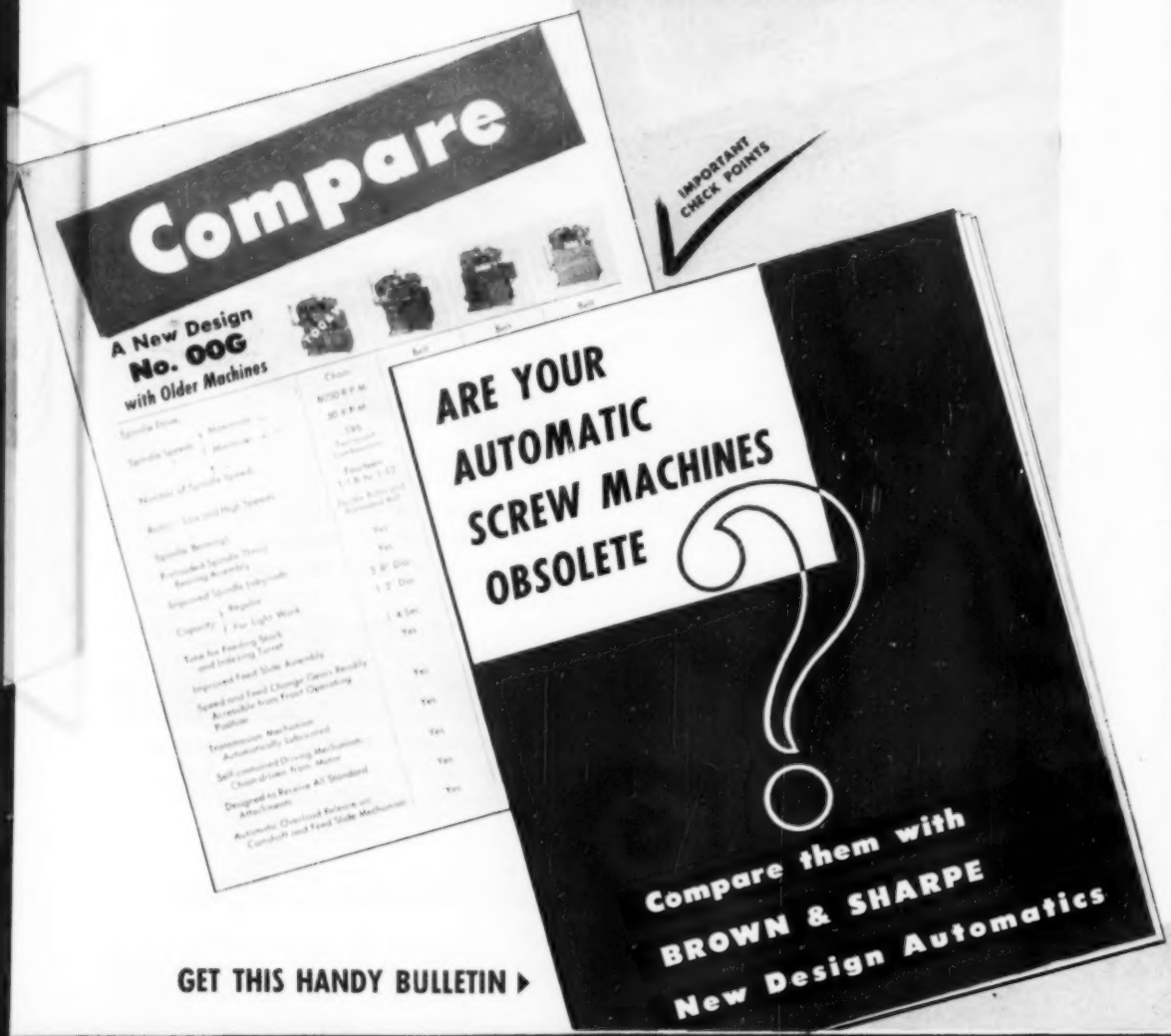
★ Roughing, Semi-Finishing, Finishing — these new "**Heavy-Cut**" Reamers produce better quality holes with fewer sharpenings. The rigidity and strength, produced by the action of the 2° wedge and reverse pin mounting, is equivalent to solid design — replacement blades offer long life, and cost saving advantages. Short style, Long style, Straight or Taper Shanks and Shell types offer a wide selection to meet a variety of production requirements. Check your reaming problems with a Barber-Colman representative today. You can save money on rough, semi-finish or finish reaming by using this new line of tools.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 9118 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

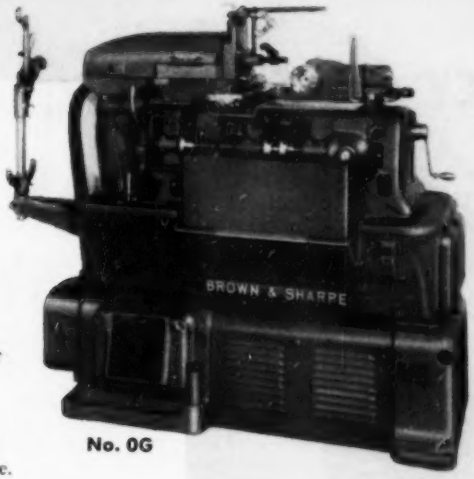
BARBER COLMAN

See why today's AUTOMATICS are much more productive than older models



GET THIS HANDY BULLETIN ▸

BROWN &

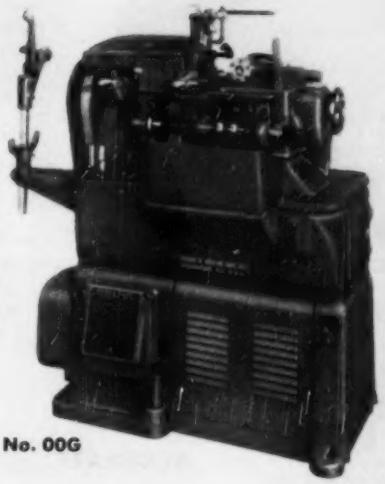


No. 0G

Maximum production per hour from every machine tool in your plant is more essential than ever, as today's conditions become increasingly competitive.

The new Brown & Sharpe Bulletin at the left shows how you can gain by replacing older automatic screw machines with those that embody the very latest features in design and construction. Features of today's Brown & Sharpe models and previous models, in chart form, make comparisons easy . . . fast . . . positive.

Send for your copy of this handy, helpful bulletin and guide, "Are Your Automatic Screw Machines Obsolete?" It covers the facts that you would ordinarily collect and correlate before making an investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



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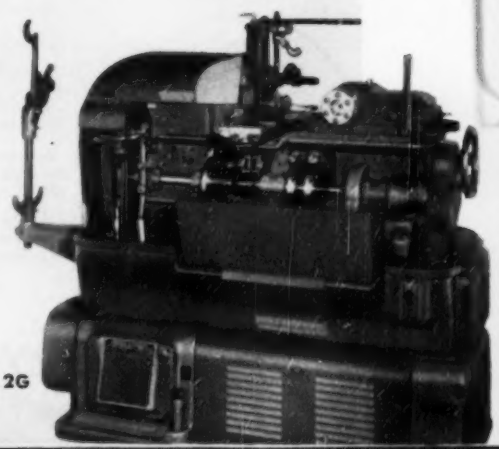


No. 2G

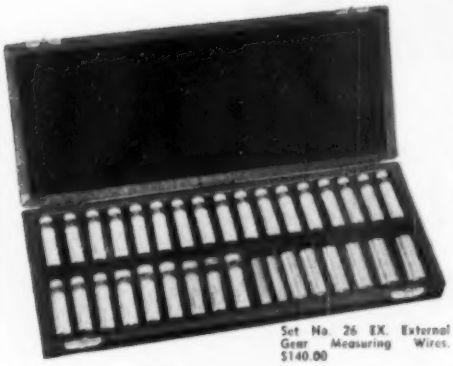
SHARPE B·S

ACCURACY *the* EASY WAY...

with the

Van Keuren >>>> GEAR MEASURING SYSTEM

Spurs, Helicals, Splines, Serrations



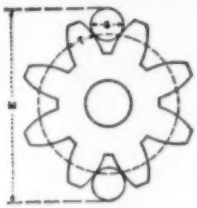
Set No. 26 EX. External Gear Measuring Wires. $140.00

THE Van Keuren Gear Measuring System is generally accepted as the easiest and most accurate method of checking tooth thickness of gears, 30° involute splines and 90° involute serrations. A measurement is made over two opposing wires and this actual measurement is compared with the theoretical measurement over wires for a perfect gear as computed from the Van Keuren tables for 1 diametral pitch gears.

The only equipment required is a set of 2 wires of the proper size for each diametral pitch.

Standard sizes of wires available from stock are:—

1.728" / DP	for external spurs and helicals.
1.44" / DP	for internal spurs and splines.
1.92" / DP	for enlarged pinions, 30° involute splines and 90° involute serrations.
1.68" / DP	Alternate series for special requirements.



EXTERNAL SPUR GEAR

SIMPLE...

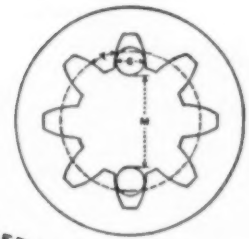
For spur gears, involute splines and serrations, the only calculation is one of simple division. For helical gears use the simplified computation forms VK-103, VK-104 or VK-105.

RELIABLE...

The 1.728"/DP System is used by over 90% of American gear producers and users. The 1.44" DP and 1.92"/DP systems have been incorporated in standards for involute splines and serrations.

ACCURATE...

The Van Keuren Gear Tables are complete for gears from 5 to 500 teeth and for pressure angles of 14½°, 17½°, 20°, 25° and 30°. If the measurement over the wires is greater than the value calculated from the tables, the tooth is too thick and the cutter must be fed further into the gear blank. Constants for controlling tooth thickness and backlash to .0001" are given for all pressure angles.



INTERNAL SPUR GEAR

MEMBER OF AGMA

CATALOG AND HANDBOOK No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

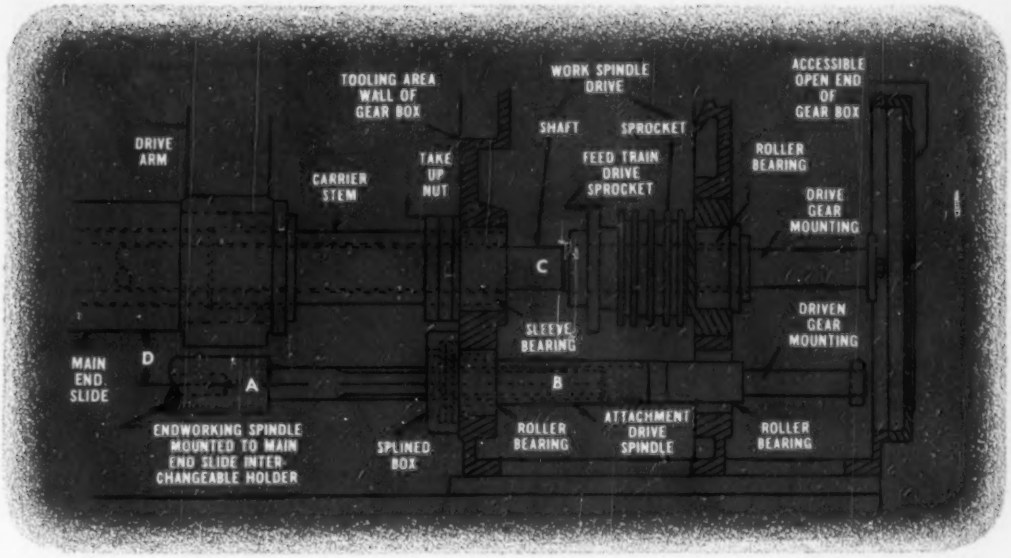
It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies now free upon request.

THE *Van Keuren* CO., 173 WALTHAM STREET, WATERTOWN, MASS.

31st YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

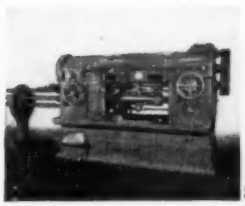
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT,** which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.



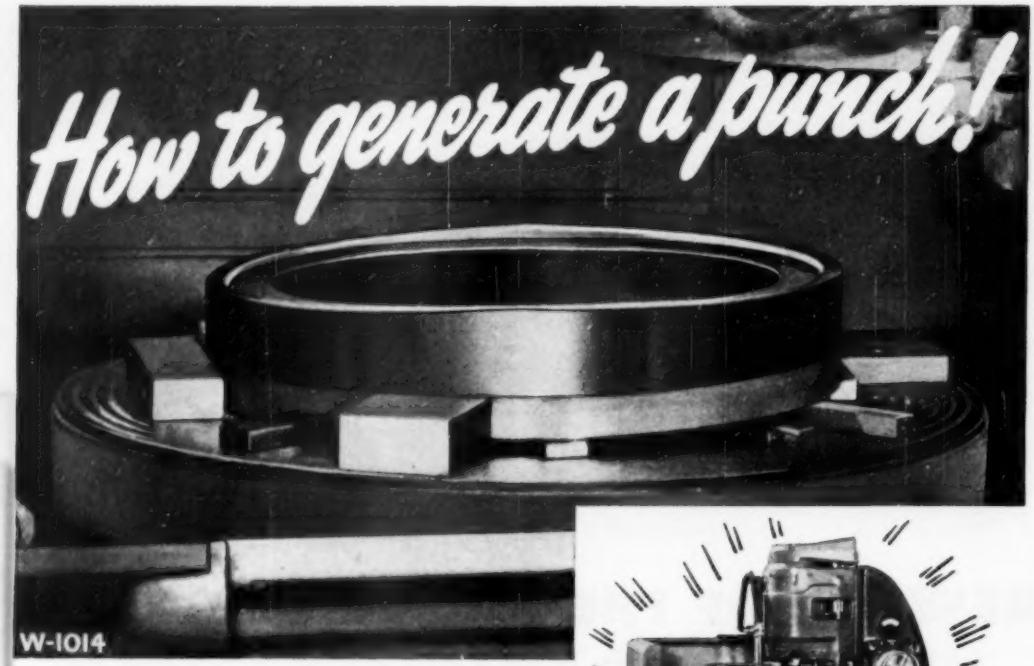
Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

5 Conomatic}

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

How to generate a punch!



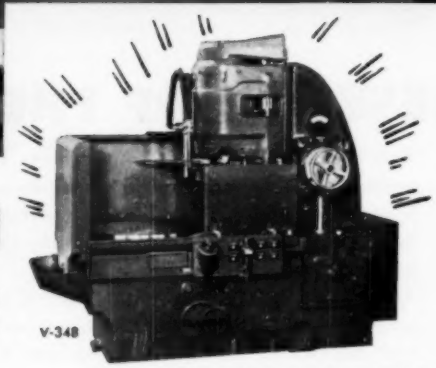
... Put it on the BLANCHARD

Obviously this is no ordinary surface grinding job—and obviously the Blanchard No. 18, with tilting wheelhead column, is the right machine for the job.

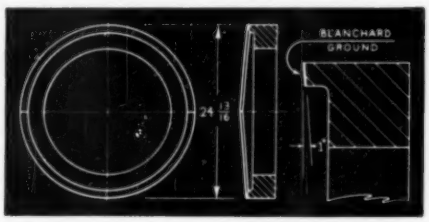
Duplicate circumferential and radial shear reliefs are generated in two set-ups on this 24 13/16″ punch. Resharpening operation takes approximately 45 minutes.

Each portion is ground by the following method. The punch is centered on the magnetic chuck, and wedged to raise one side to obtain proper circumferential shear. The wheelhead is then tilted to a predetermined angle. A normal grinding operation generates the specified shape on one half of circle.

Blanchard is in a unique position to help you solve surface grinding problems that may look difficult or impossible —by methods that prove easy and profitable. Send samples or prints for free production estimates.



NO. 18 BLANCHARD SURFACE GRINDER



Send for free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE BLANCHARD **THE BLANCHARD MACHINE COMPANY**
64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

SNYDER TOOL & ENGINEERING COMPANY

3400 E. LAFAYETTE, DETROIT 7, MICH.

SOFT GRAY CAST IRON
Tensile 30,000 psi

"GM" MEEHANITE Metal
Tensile 60,000 psi

STEEL CASTING—0.38%C
Tensile 73,500 psi

Combines the best properties of both cast iron and steel!

The description of Meehanite metal as "Bridging the Gap" between cast iron and steel was first written just 11 years ago. Since that time Meehanite castings have been providing designers, engineers, casting users, with a superior quality material. By offering unique combinations of the better properties of both iron and steel they have met many unusual demands and specifications.

The basic facts are revealed by the microstructures of the three materials. The ability to control both the quantity, size and form of the graphite as well as the nature of the pearlitic matrix of Meehanite metal, provides the means of predetermining engineering properties so as to meet exacting specifications.

Whether you need a soft, average-property iron (30,000 psi) or a tough, high-strength material providing uniform solidity, quality and dependability, specify Meehanite metal and consult any of the foundries listed below.

Ask for the Handbook of Meehanite Metals, a 67-page engineering manual which will prove of real value to any casting user.

Take Your Casting Problems To A MEEHANITE Foundry!

American Brake Shoe Co. — Mahwah, New Jersey	Florence Pipe Foundry & Machine Co. — Florence, New Jersey	Pullman Foundry Co., Inc. — Buffalo, New York
The American Laundry Machinery Co. — Rochester, New York	Fulton Foundry & Machine Co., Inc. — Cleveland, Ohio	The Prosser Co. — Menominee, Michigan
Atlas Foundry Co. — Detroit, Michigan	General Foundry & Manufacturing Co. — Flint, Michigan	Rossdale Foundry & Machine Co. — Pittsburgh, Pennsylvania
Bonner Iron Works — St. Louis, Missouri	Groombee Foundry Co. — Chicago, Illinois	Ross-Meehan Foundries — Chattanooga, Tennessee
Burnett Foundry & Machine Co. — Irvington, New Jersey	The Hamilton Foundry & Machine Co. — Hamilton, Ohio	Shenango-Penn Mold Co. — Dover, Ohio
E. W. Bliss Co. — Hastings, Mich. and Toledo, O.	Johnstown Foundries, Inc. — Grove City, Pennsylvania	South Industries, Inc. — Indianapolis, Ind.
Builders Iron Foundry Inc. — Providence, Rhode Island	Kanawha Manufacturing Co. — Charleston, West Virginia	Standard Foundry Co. — Worcester, Massachusetts
H. W. Butterworth & Sons Co. — Bethayres, Pennsylvania	Koebring Co. — Milwaukee, Wisconsin	The Stearns-Roger Manufacturing Co. — Denver, Colorado
Continental Gin Co. — Birmingham, Alabama	Lincoln Foundry Corp. — Los Angeles, California	Traylor Engineering & Mfg. Co. — Allentown, Pennsylvania
The Cooper-Bessemer Corp. — Mt. Vernon, Ohio and Grove City, Pa.	E. Long Ltd. — Orillia, Ontario	Valley Iron Works, Inc. — St. Paul, Minnesota
Crawford & Doherty Foundry Co. — Portland, Oregon	Otis Elevator Co., Ltd. — Hamilton, Ontario	Vulcan Foundry Co. — Oakland, California
Farrel-Birmingham Co., Inc. — Ansonia, Connecticut	The Henry Perkins Co. — Bridgewater, Massachusetts	Warren Foundry & Pipe Corporation — Phillipsburg, New Jersey

"This advertisement sponsored by foundries listed above."

MEEHANITE.

PERSHING SQUARE BUILDING • NEW ROCHELLE, N. Y.

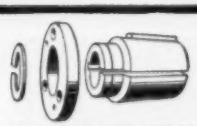
4 BIG ADVANTAGES!

ONE PIECE MOUNTING

Bushing and sheave go on together. One motion mounting. Alignment is easier. Sheave is on right first time.

POSITIVE DRIVE

Bushing is keyed to both shaft and sheave. No slipping. No sheared screws. No jammed bushings from bent screws.



FULL CIRCLE GRIP

Bushing split full length with separate collar. Grips shaft full length around full diameter. No forcing or distortion. Grip easily broken. No hammering.

WIDE SIZE RANGE

Magic Grip sheaves are available from 3" pitch diameter up. Style NC bushing for smaller sizes and Style C bushing for larger sizes.

MAGIC GRIP SHEAVE

YOU CAN MOUNT a *Magic Grip* sheave faster than any other sheave you can buy . . . and demount it just as fast. When you mount a *Magic Grip* sheave it runs true. It will not slip or jam. It always comes off easily.

Even if you don't change sheaves often, you should have *Magic Grip* sheaves on every drive to eliminate the possibility of shaft and bearing damage when ordinary sheaves are hammered or pried on or off.

WIDEST V-BELT LINE

Get everything you need for your V-belt drives from one reliable source. *Texrope* offers the broadest line of V-belts, standard and variable speed sheaves and speed changers in the industry. And you also get the extra engineering skill that comes from having more industrial V-belt installations than any other manufacturer.

Get your copy of the 144 page *Texrope* Pre-Engineered Drive Manual from your A-C Authorized Dealer or Sales Office or write for Bulletin 20B6956.

A-3022

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

Texrope and *Magic Grip* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

Here's how

JEFFREY

Manufacturing Company's Canadian Plant

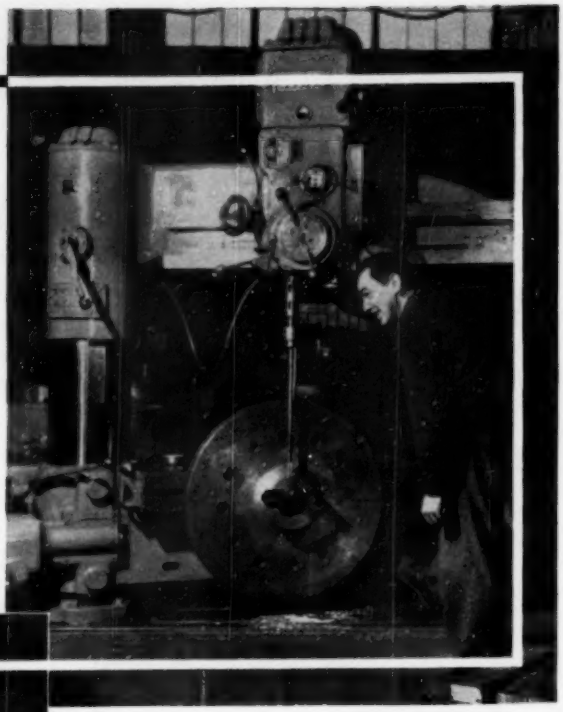
takes advantage of

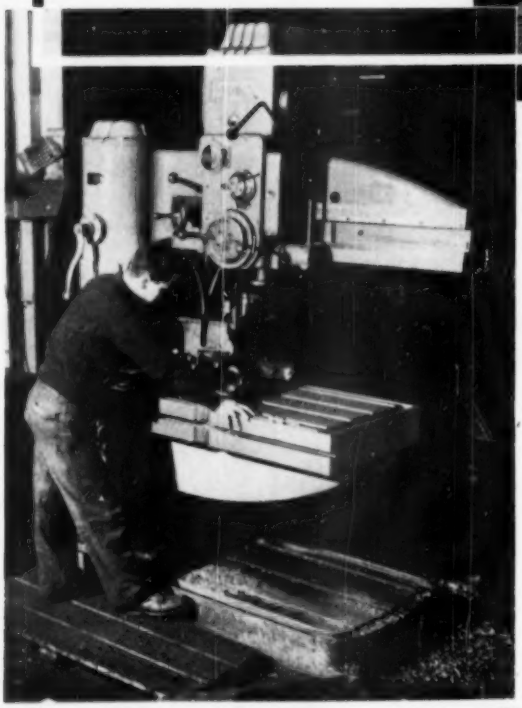
FOSDICK

Sensitive

RADIALS

Utility





● The job above illustrates the use of the horizontal slot along the side of the table for holding the large circular casting in position for tapping hole in hub.

The view at the left shows the work being drilled mounted in a jig on the adjustable table.

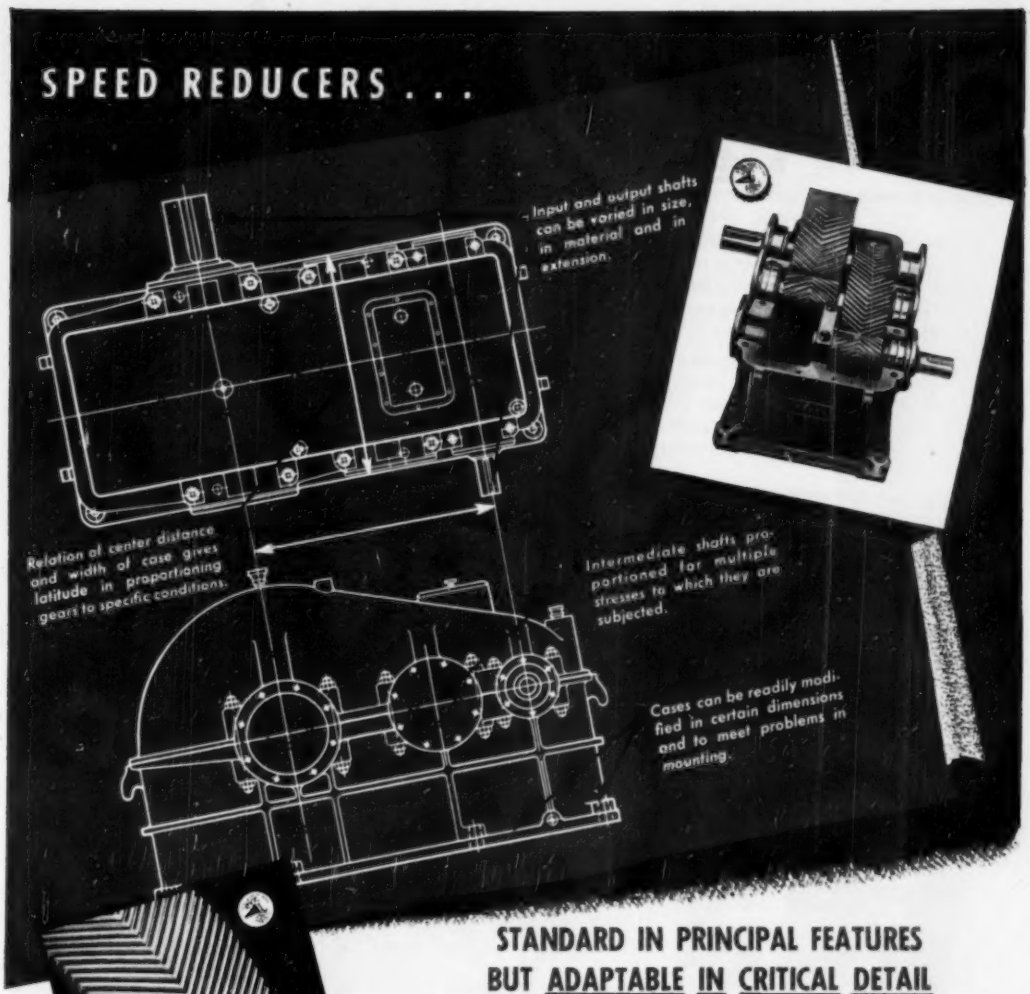
The two jobs indicate clearly the versatility of the machine for handling a wide variety of sensitive drilling, reaming, tapping and similar operations.

If you are looking for all around utility on your sensitive drilling operations, you should investigate the Fosdick Sensitive Radial.

For full particulars on the design—construction—and operation of this time and labor saving machine, ask for the new Fosdick Sensitive Radial Bulletin, S.R.A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

SPEED REDUCERS . . .


Input and output shafts can be varied in size, in material and in extension.
Relation of center distance and width of case gives latitude in proportioning gears to specific conditions.
Intermediate shafts proportioned for multiple stresses to which they are subjected.
Cases can be readily modified in certain dimensions and to meet problems in mounting.

THE GEAR WITH A BACKBONE

The gears used in Farrel speed reducers have a *backbone*, formed by the meeting of the two helices. This backbone provides extra strength and greater load-carrying and shock capacity — especially important in heavy duty units. Precision generation by the famous Farrel-Sykes method assures accuracy of tooth spacing, tooth contour and helix angle, which pay off in smooth, quiet, uniform operation.

STANDARD IN PRINCIPAL FEATURES BUT ADAPTABLE IN CRITICAL DETAIL

Farrel speed reducers have been developed for continuous, trouble-free operation under difficult service conditions. Gears, shafts and bearings are factored to safeguard against interruption of vital processes; gear cases are proportioned to withstand repeated heavy peak loads; joints are sealed to prevent entrance of dust and dirt.

But, that is not all. Without sacrificing the advantages of general standards, the design of these units permits an engineering freedom in proportioning gears, shafts, bearings and even some housing dimensions to meet specific load, speed and service requirements. This flexibility allows an engineering exactness in critical detail, which has resulted in the solution of innumerable application problems.

Write for further details. Ask for a copy of Bulletin 449— no cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC. • 344 VULCAN STREET, BUFFALO 7, N. Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Cincinnati, Detroit, Chicago, Los Angeles, Tulsa, Houston, New Orleans.

FB-592

Farrel-Birmingham®

Will your new lathe

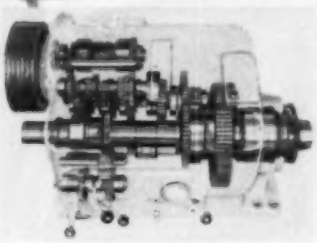
have *all* these important features?

You're not getting *all the value* your money can buy if your next lathe does not include *all* these important features. All these standard features, proved in operation, mean greater profits . . . in any size shop.

Many of the features listed here are exclusive with Lodge & Shipley "X" Lathes; others are not. But—no other lathe, only the Model "X" Lathe, combines *ALL* these profit-making features. DON'T BE SATISFIED WITH LESS!

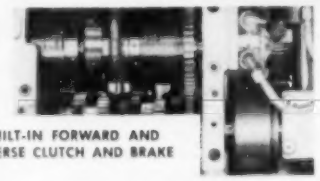
USE THESE FEATURES AS A CHECK LIST FOR YOUR NEXT LATHE

- 24 Spindle Speeds
- Built-in forward and reverse clutch and automatic brake
- Totally enclosed quick change gear box
- "Sustained alignment" bedways of hardened steel
- Positive feed clutches
- Inverted dovetail slides
- 3 bearing spindle mounting
- Slide rule calculator
- 20 H.P. in small sizes 30 H.P. in larger sizes
- All-Automatic lubrication
- Hardened cross-feed screw threads with compensating nuts
- Hardened spindle nose
- Sliding spur gears



24 SPINDLE SPEEDS

Why 24? Because fewer spindle speeds will not provide the most efficient cut speed for every tool and material. 24 speeds provide a more selective range from low-speed precision chasing up to the fastest carbide turning. The right speed means "More Profits".



BUILT-IN FORWARD AND REVERSE CLUTCH AND BRAKE

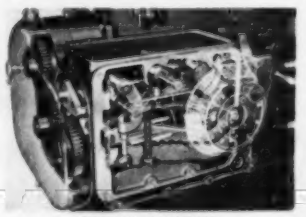
Gives easy control of carriage traverse for non-standard threading without use of reverse to leadscrew, spindle reversal for backing-off taps, and reverse spindle rotation for turning and boring where that is more advantageous. Do greater variety of work, get "Greater Profits".

"SUSTAINED ALIGNMENT" BEDWAYS of HARDENED STEEL

Exclusive Model X bedways guide carriage from front combined straight and angular way only. Thus the carriage cannot lift or bellmouth under the heaviest cuts. *Renewable* hardened and ground steel ways permanently located on the bed by a tongue and groove, make wear *immeasurable*. Produce finest work for years to come. "Sustain Profits"

SLIDE RULE CALCULATOR

Eliminating guesswork, tedious figuring and mistakes, the slide rule calculator takes the question mark out of speed settings. Calculator visually determines RPM and lever settings for most economical cut speeds for a given diameter. Eliminate guesswork; add "More Profits".



TOTALLY ENCLOSED QUICK CHANGE GEAR BOX

Patented, dial-operated control of 55 threads and feeds eliminates time formerly wasted trying to move old-fashioned sliding tumbler. Totally enclosed, oil tight box prevents foreign matter damaging precision gearing and makes possible automatic, *recirculating, lubrication*. Low maintenance costs spell "More Profits"

20 H.P. BUILT-IN TO SMALL SIZES 30 H.P. IN LARGER SIZES

Model "X" Lathes easily transmit 20 H.P. in the high range of small sizes and 30 H.P. in that of the larger sizes. Calculator shows maximum H.P. that may be transmitted at each RPM; Ammeter (optional, extra cost) indicates H.P. supplied to the machine. With this combination an operator can safely use the greater H.P. available. More Horsepower means "More Profits"

INVERTED DOVETAIL SLIDES

Don't let "pared down" swing capacity limit your range of work. *Greater swing* over the cross slide and greater strength in the compound rest assembly have been attained by the unique inverted dovetails construction. The cross slide is appreciably lowered in all sizes of Model X Lathes. Machine a wider range of work; "Increase Profits".

Write for new "Features Catalog #200" for full information on these essential features for the lathe buyer. Use company letterhead, please.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

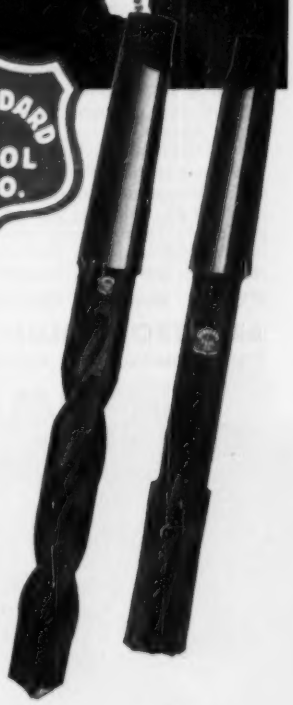
For service it's Standard *Coast to Coast*

TO serve you well we must provide prompt, accurate and reliable service in delivery of the types of tools you need at the time you need them.

This we do through district warehouses located coast to coast as shown on the map above. A leading Industrial Supply Distributor in your community, serviced from one of these district warehouses, can supply your complete requirements for Standard Shield Brand Tools.

Profit-making qualities of Shield Brand Tools are: Foremost quality in design, workmanship, material—completeness of the line—plus the nation-wide service shown above.

Our trained service staff with the accumulated knowledge of 69 years experience in metal cutting problems can help solve your tough problems—no cost or obligation. Write us.



We'll welcome you at Conference Booth No.'s 907-908, Industrial Supply Convention, Public Auditorium, Atlantic City, New Jersey, May 22-23-24.

STANDARD TOOL CO. CLEVELAND 4, OHIO

New York • Detroit • Chicago • San Francisco

THE STANDARD LINE: *Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools*

Only MARVEL *builds all four**

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds *BOTH* hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and *unbiased* recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing *machines* and metal sawing *blades*. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request—gratis.

Write for Catalog 49

ARMSTRONG-BLUM MFG. CO.

BLOOMINGDALE AVE., CHICAGO 39, U.S.A.

***HACK SAWING MACHINES**

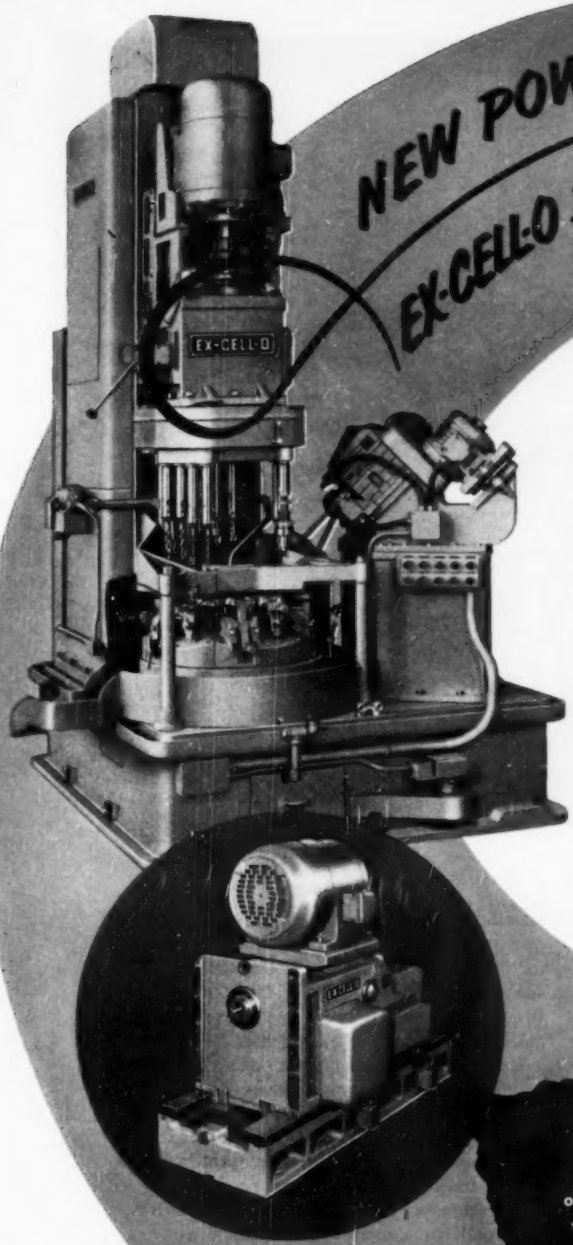
***BAND SAWING MACHINES**

***BAND SAW BLADES**

***HACK SAW BLADES**

MARVEL Metal Cutting SAWS
No. 9A Marvel Hack Saw
No. 5 Marvel Band Saw
MARVEL High-Speed-Edge HACK SAW BLADE
MARVEL Metal-Cutting BAND SAW BLADE

NEW POWER UNITS FOR EX-CELL-O SPECIAL MACHINES



CONFORM TO J. I. C. STANDARDS

This Ex-Cell-O Special Machine utilizes a new slide type hydraulic power unit for rotating and feeding the tools in the multiple spindle head. The new power units, in two sizes to accommodate motors up to 25 horsepower, are built in strict conformance with the standards established by the Joint Industry Conference of the automobile industry.

Ex-Cell-O Slide Type Hydraulic Power Units do not replace the standard Ex-Cell-O Quill Type Hydraulic Power Units which are used to drive less bulky multiple spindle heads or single tools. Both types of units often are used to good advantage on the same machine.

For economy in multiple machining operations such as drilling, reaming, spotfacing and counterboring, be sure to get a quotation on an Ex-Cell-O machine with standard, versatile Ex-Cell-O Hydraulic Power Units.

XLO

Ex-Cello-O Style P1 Slide Type Hydraulic Power Unit with motor mounted for horizontal installation. Same unit is mounted vertically on machine above.

FEATURES

of Ex-Cell-O Slide Type Hydraulic Power Units

1. Conform to J.I.C. standards
2. Smooth hydraulic action
3. Simple construction—no gears
4. Adjustable automatic cycles
5. Self contained—can be re-used
6. Hardened, ground steel ways
7. Manifold-mounted hydraulic components
8. Positive stop in line with thrust

50-21

EX-CELL-O CORPORATION DETROIT 32 MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

YOU MIGHT DOUBLE OUTPUT AND CUT COSTS IN HALF. One company was grinding 1.3152" O. D. x 11/16" bearing races at a rate of 300 per 8-hour shift on two old-style internal grinders—one for roughing and one for finishing. Two operators were required.

They found that handling time between the two operations was the most time-consuming element in the machine cycle. They proved that reduction of grinding time alone was not the best way to reduce floor-to-floor time.

Two new No. 1216 Bryant Internal Grinders are now producing 675 of these bearings per 8-hour shift, because each machine not only grinds faster, but roughs and finishes in an automatic cycle, and *eliminates the rehandling and rechucking of each part.* A single operator easily attends both machines. The tolerance for hole size is plus .0005 inch, minus .0000 inch, and, although taper must be held to .0003 inch, the Bryants consistently hold this tolerance to .0001 inch. Surface finish is about 8 micro inches.

It won't cost to check production of your machines against estimated production of new machines.

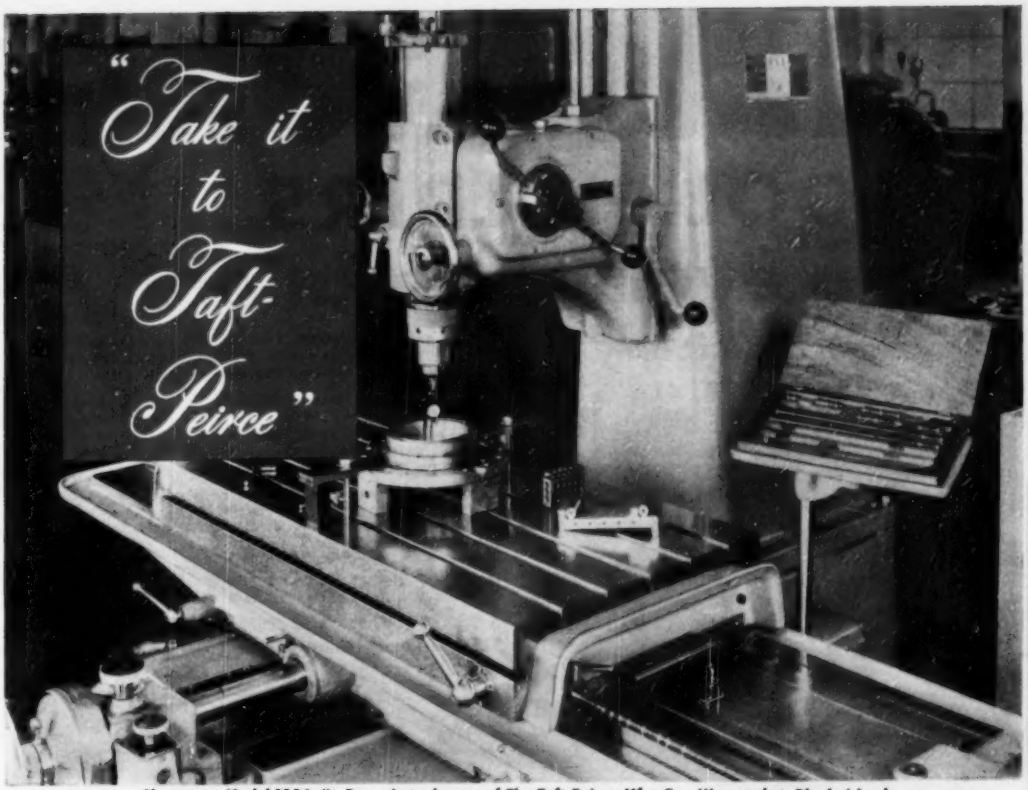
Bryant Chucking Grinder Company is prepared to give you accurate figures on production and costs so that your management can translate them into terms of investment. Send your present production figures to Bryant now. We will give you data which may help you buy that much needed machine.

Remember—it won't cost to inquire.

BRYANT

CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U.S.A.

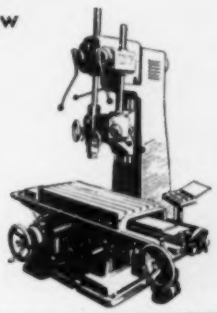


Cleereman Model 1836 Jig Borer in tool room of The Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.

...where a CLEEREMAN JIG BORER

helps maintain this shop's world-wide reputation of unexcelled precision

Taft-Peirce world-wide reputation for accuracy and quality is based upon selected precision tools and the strict traditions of New England craftsmanship. Upwards of fourteen hundred machine tools of the latest and best types are available for every class of machine tool work.



Cleereman Jig Borers are being installed by an increasing number of plants where, as is the case with Taft-Peirce, uncompromising accuracy is essential.

Affiliated with—

CLEEREMAN MACHINE TOOL CO. Green Bay, Wis.

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

ARMSTRONG

TOOL HOLDERS... for every operation!

There are ARMSTRONG Tool Holders in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for Catalog.

ARMSTRONG BROS. TOOL CO.

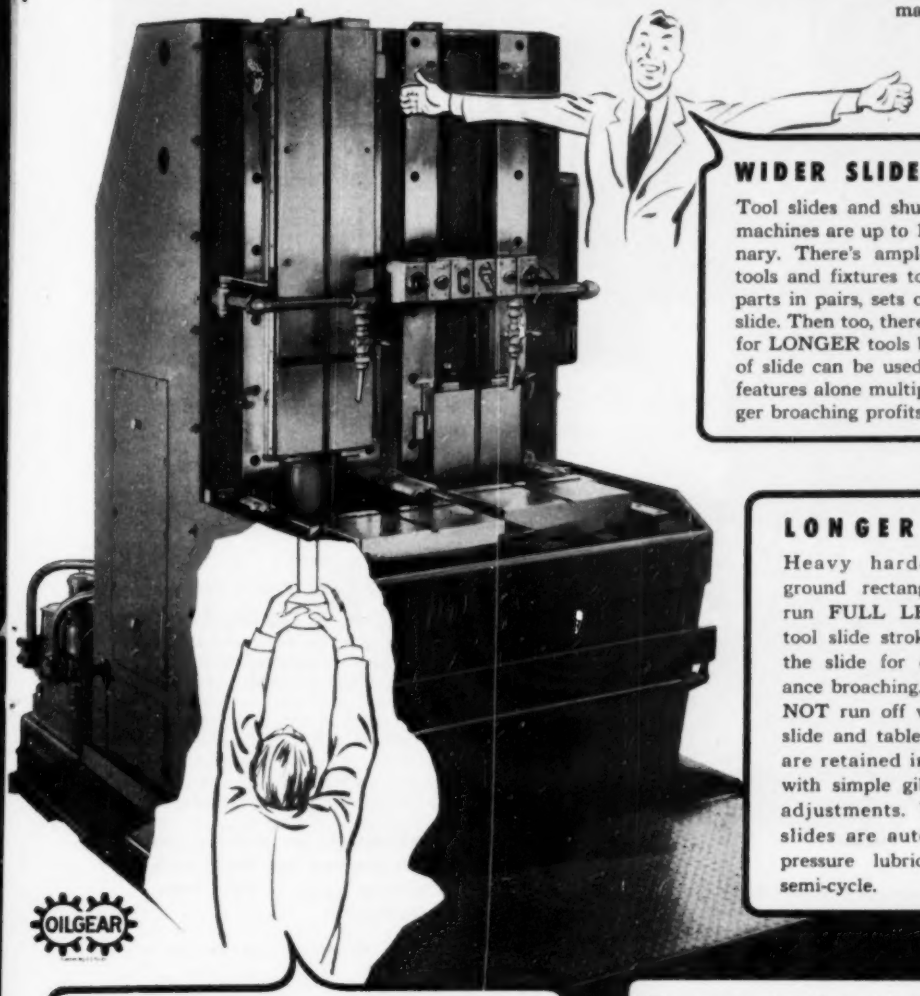
"The Tool Holder People"

5215 W. Armstrong Ave. Chicago 30, Ill.

...IN OILGEAR SURFACE BROACHING MACHINES

When you purchase an Oilgear Surface Broaching Machine you get a big bonus of features which are not incorporated in other machines.

Consider these important features carefully for if you don't get Oilgear *features* you can't get Oilgear *performance*.



WIDER SLIDES AND TABLES

Tool slides and shuttle tables on Oilgear machines are up to 130% wider than ordinary. There's ample room for grouping tools and fixtures to broach two or more parts in pairs, sets or sequence on **EACH** slide. Then too, there's up to 4" more room for **LONGER** tools because the full stroke of slide can be used for broaching. These features alone multiply production for bigger broaching profits.

LONGER WAYS

Heavy hardened and ground rectangular ways run **FULL LENGTH** of tool slide stroke to guide the slide for close tolerance broaching. Slides **DO NOT** run off ways. Close slide and table clearances are retained indefinitely with simple gib and way adjustments. Ways and slides are automatically pressure lubricated each semi-cycle.

TOOLS ARE PULLED . . . NOT PUSHED

Cylinder ram **PULLS** slide downward to broach work; ram is in **TENSION** under broaching load and not in compression. There's no ram **DEFLECTION** to cause wear on ram, packing and cylinder. Positive delivery of oil to pulling side plus a rigid column of oil on return side gives **SMOOTH** operation. Then too, you get up to 100% higher return speed and save power with our simple regenerative system.

These are only a few of the many exclusive features in Oilgear Fluid Power Variable Speed Broaching Machines. Write for complete descriptive bulletins. **THE OILGEAR COMPANY, 1563 W. Pierce St., Milwaukee 4, Wisconsin**

Oilgear Fluid Power

Here's a NEW ADAPTATION of the VERTICAL PULL-UP LAPOINTE BROACHING MACHINE

A leading automotive manufacturer is using this Lapointe Vertical Pull-Up Machine to broach this Race-Transmission Converter, for a one-way clutch. Other parts broached on the same machine are the Hub Turbine and Hub Front Clutch for Automatic Transmission. These are being broached 2-at-a-time, and at 80% efficiency the production rate is *300 per hour!*

Do you mass-produce small PRECISION PARTS?

The Lapointe Vertical Pull-Up Broaching Machine is designed especially for the mass production of small *precision parts* such as Bushings • Piston Pins • Shock Absorber Tubes • Small Cylinders • Small Gear Blanks.

On this class of work, it will *out-produce* any other type of machine!

Note the operator's platform which provides the most convenient loading height, and places all controls within easy reach. This machine has the **New Low Pressure Hydraulic System** with sealed reservoir, and conforms in every other respect with J. I. C. standards.

Electrolized **BROACHES** are *exclusive* with Lapointe. Electrolyzing lengthens tool life as much as 3 to 10 times between grinds in many cases. Write for our Electrolyzing story.

Send for descriptive bulletin covering the entire series of Pull-Up Machines. Ask for Bulletin VPU 2.

THE *Lapointe* MACHINE TOOL COMPANY

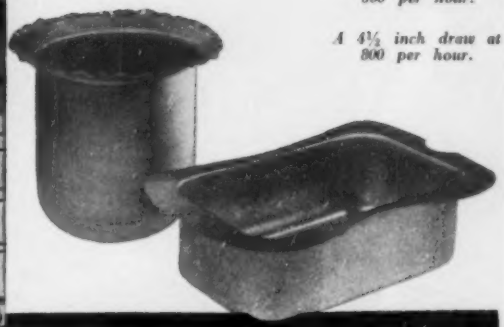
HUDSON, MASSACHUSETTS, U. S. A.

Branch Factory: Edgware, Middlesex, England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

A 9½ inch draw at 500 per hour.

A 4½ inch draw at 800 per hour.



800 DRAWS AN HOUR!

Proof that H-P-M Hydraulics are really *fast*

● Production hit a new high at U. S. Stamping Company when an E-P-M 150-ton all-hydraulic double-action draw press was put to work. Imagine 800 draws per hour! This even tops mechanical draw presses! Its wide range of speeds and controls . . . automatic cycle . . . easy die set up . . . its ability to produce quality parts with low scrap loss (less than 1% in most cases) makes it the ideal press for producers of enameled ware, where speed is of prime importance. Other H-P-M units are doing an equally outstanding job for these enameled ware manufacturers . . . Vollrath, Republic, Benjamin Electric, National, Federal, and Belmont.

If you want low production costs . . . switch to stampings and high-speed H-P-M hydraulic presses. Call in a nearby H-P-M engineer. He will gladly show you how H-P-Ms will fit into your production picture . . . and save you real money!

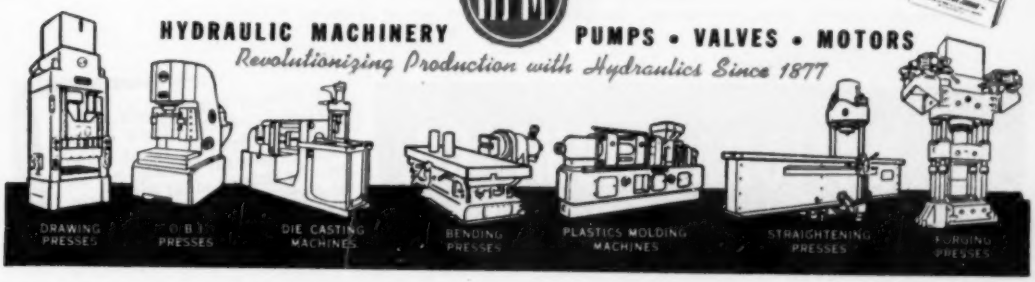
THE HYDRAULIC PRESS MFG. CO.
1002 Marion Road **Mount Gilead, Ohio, U.S.A.**

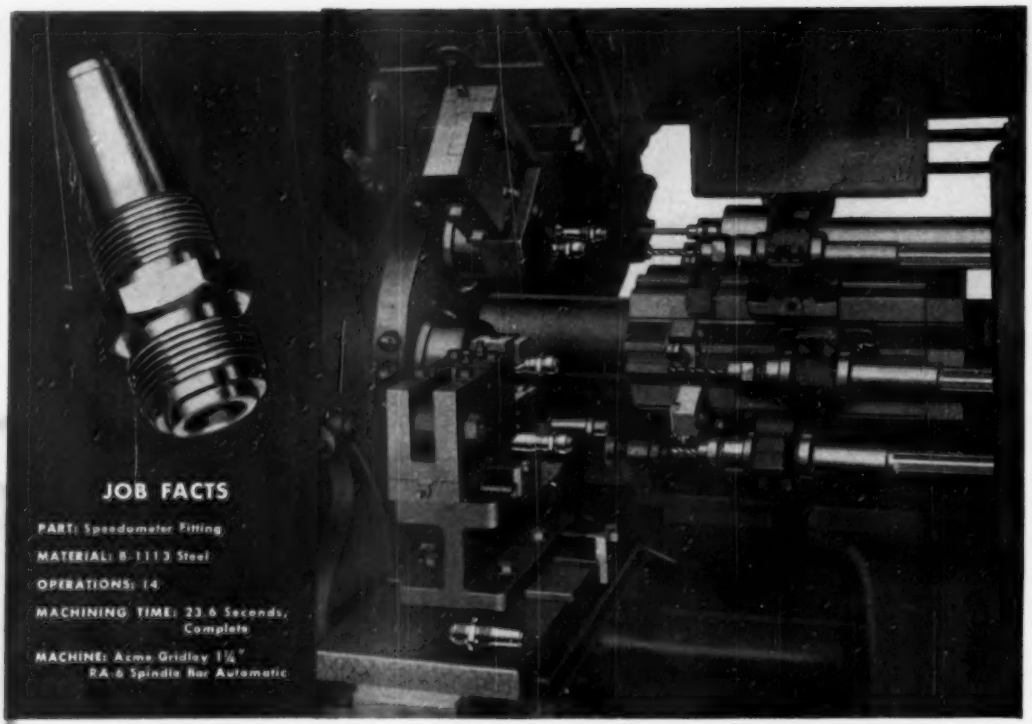
Write for a free copy of "Why Hydraulic Presses," a reprint from a leading metal-working trade journal.

HPM

HYDRAULIC MACHINERY **PUMPS • VALVES • MOTORS**

Revolutionizing Production with Hydraulics Since 1877





COST-CUTTING COMBINATION:

—One Machine Instead of Two
—Output Increased 16%

Fourteen operations in 23.6 seconds! That's the kind of timesaving production you get on modern Acme-Gridley Automatic bar machines.

You'll make other savings, too—in machines, man hours and overhead. Acme-Gridleys are designed to take a wide variety of cut-combining, power-driven auxiliaries that "up" production per machine.

Take the job illustrated: the fourteen required operations formerly were done on two machines, the first seven on one, the remainder on the second. By arranging the tooling to include rolling the smaller of the two threads, the piece is now finished *on one machine* (a modern Acme-Gridley Automatic) and at a gain in output of 16%.

The particular job may not be applicable in your shop *but the basic principle—that Acme-Gridleys cut costs—is.* May we show you how—in terms of your own specific metal-turning needs—either bar or chucking work?

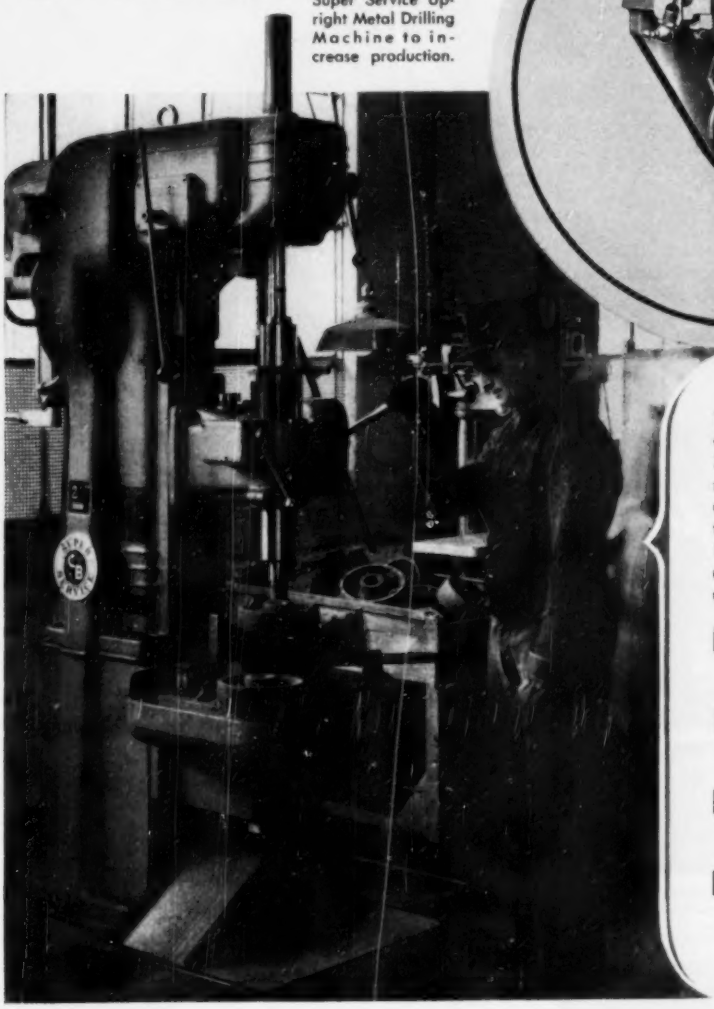
The NATIONAL ACME CO.

170 EAST 131st STREET · CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics · Single Spindle Automatics · Hydraulic Thread Rolling Machines · Automatic Threading Dies and Taps · The Chronolog · Limit, Motor Starter and Control Station Switches · Solenoids · Centrifuges · Contract Manufacturing

New production increase...

The Hamilton Caster and Manufacturing Company, Hamilton, Ohio chose a 21" Direct Drive HIGH PRODUCTION Super Service Upright Metal Drilling Machine to increase production.



This machine is opening up cored holes (15/16" diameter X 3-¼" deep) in rubber tired shop truck wheels. The accuracy of this operation is held to such limits as to permit the insertion of bearing outer races. Savings are now being realized in:

PRODUCTION Increases
LABOR COST Reductions
POWER COST Reductions
FLOOR SPACE Reductions

Good judgment in selecting the proper machines, tools, and fixtures will consistently produce the best manufacturing results. Our CUSTOMER PRODUCTION ENGINEERING SERVICE in the metal drilling field represents the collective experience of many years (since 1874). Make your problems ours - - let us show you a profitable Radial or Upright Drill production application. Your most urgent production problems warrant our immediate attention.

Equal Efficiency of Every Unit
Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO
SUPER SERVICE
RADIAL AND UPRIGHT DRILLING MACHINES

Radials 7½" dia. col., 2½" arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28"
Jig Borers, Portable Horizontals,
Spacing Table Machines

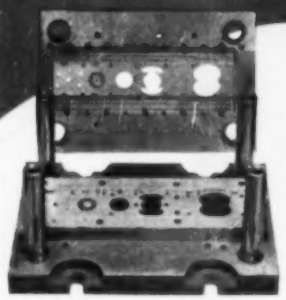
THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio

160 pieces a minute to tolerances of less than .0005"!

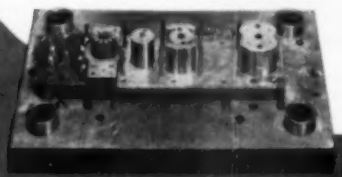
These rotor and stator elements are stamped in the six station die shown below in a 50-ton press at 80 strokes per minute. With half thousandth piece part tolerances, almost perfect die alignment is a must! That's why . . .

they built the die in a

DANLY PRECISION DIE SET



Die built by the Sherman Tool & Die Co., Charlestown, Massachusetts, for the Signal Manufacturing Co., Lynn, Massachusetts, in a Special Danly Precision Die Set



Danly precision makes every Danly Die Set a reliable base for the finest die work. They save time in the die shop because they are square and true . . . they assure longer production runs in the press because precision closure protects die components.

Standard Danly Die Sets are quickly available from a nationwide system of completely stocked assembly branches. Just phone for fast delivery, and for the finest in die set precision, always specify Danly.

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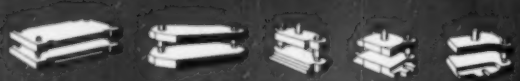
2100 South 52nd Avenue Chicago 50, Illinois



PRECISION DIE SETS . . . STANDARD AND SPECIAL

DANLY®

SPOT NEWS of Metalworking

- **More money for military planes is almost certain.** Either Congress will appropriate the extra $500-million backed by General Eisenhower or President Truman will release Air Force funds he has refused to spend. It may even be both.

- **Importation and national distribution of British hacksaw blades** will be aided by recent arrangements made by U.S. hacksaw users. British blades will be made to conform to American standards so they may be used on U.S. machines. Purpose: to aid industrial recovery in Britain.

- **Fiat is reported negotiating with British DeHaviland** to make jet engines and planes under license. Fiat has not built military craft since war and still is not allowed to.

New alloy principally of zinc, with small quantities of copper and beryllium added, has same strength and electrical characteristics as brass and is cheaper, Dr. R. H. Harrington of General Electric Research Laboratory states. Called "zncube" (pronounced "zin-cue-be"), the alloy has eight times useful strength of any zinc alloy now in use.

- **Germany is five years ahead of U.S. in use of carbides** in various tools, according to head of a Detroit engineering firm, just returned from Europe.

- **Employers may not question non-communist affidavits** filed by union leaders. NLRB says it has full say-so on whether a union has complied with this section of Taft-Hartley. That's what it told Sunbeam Corp. in certifying the left-wing United Electrical Workers as winner over IUE.

- **First two rail diesel cars, each powered by two General Motors diesel engines** connected by torque converter, have been delivered to New York Central by Budd Co. These new cars can be operated equally fast in either direction, can be run in multiple units and single cars dropped off at specified points to go on from there under own power. Railroads here and abroad are showing keen interest in this new development.

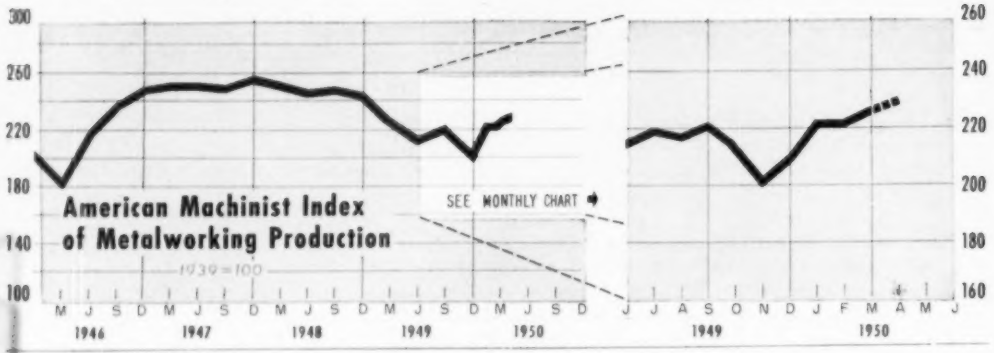
- **Latest blast at Defense Dept. economizing** comes from AFL metal trades unions who don't like use of Naval personnel in government shipyards. They claim that sailors may be paid less than civilians but cost of maintaining them is greater. Military says they would be in uniform anyhow, thus maintenance cost isn't an issue.

Vauxhall will be in production in August at its new automobile manufacturing plant at Luton which has been laid out to conform to best U.S. practice and is being equipped with U.S. high-production machines. This is part of $28-million expansion program by General Motors' British subsidiary which will greatly enlarge its present capacity of 84,000 cars annually.

- **Current (Equipment) Ratio, which shows in financial terms** the condition of a plant's machinery, has been developed by L. W. Scott Alter, president American Tool Works Co., who described it at Westinghouse Machine Tool Electrification Forum at Buffalo April 25. Ratio is based on classifying machines younger than 10 years as "assets" and all others as "liabilities."

- **General Motors is said to be experimenting with single-leaf semi-elliptic rear spring** for passenger cars. If material can be rolled to variable widths in thickness new proposed spring-making methods are likely to be revolutionized.

Gaging Metalworking



High Capacity of Steel, Autos, Other Lines Keep Metalworking Up

Key business indicators which affect Metalworking are moving up. Steel is at 100%. And this means a new record, because capacity is higher now than in wartime. Automobile output is rolling at a 7½-million annual rate, even with Chrysler shut down.

• • •

Construction contract awards are 40% ahead of a year ago. Homebuilding is at a peak. Appliance sales are at or near record highs and promise to stay there.

• • •

Trend points up in other lines, like metalworking machinery, office and general industrial machinery. Machine tool orders in March were highest since mid-1946, breaking through top to 107.4 on the industry's index.

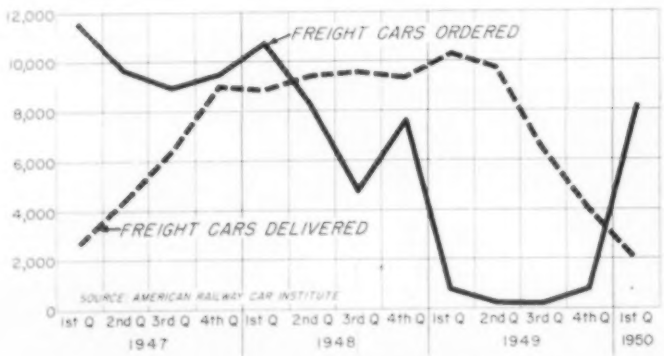
Third quarter looks good to steel people, who feel that fourth quarter may not bring much letdown. Entire year's prospects appear brighter to them than expected. Some users are taking more steel than they are fabricating; but this is less true in flat-rolled than in other products.

Chrysler has continued to accept steel right through the strike. It has asked its main parts and components suppliers to build up 60-days' inventory of steel, too. Chrysler thus is assured of enough steel to operate six days a week when its strike ends.

Sheet and strip are likely to be a bit easier in third quarter. "Conversion" deals now on are less extensive than a year ago; and prices being paid for conversion steel are considerably less than in spring of 1949.

Freight Car Orders Shoot Up After Reaching Rock-Bottom

	Freight Cars Ordered (Quarterly figures given)	Freight Cars Delivered
1947 —	11,665	2,719
	9,786	4,526
	9,036	6,548
	9,615	9,047
1948 —	10,848	8,906
	8,243	9,555
	5,892	9,661
	7,624	9,424
1949 —	731	10,379
	257	9,811
	239	6,584
	855	4,079
1950 — (1st Q)	8,220	2,051



INDEX

	APR '50	MAR '50(p)	FEB '50(r)	MAR '49
	229*	**226**	**221**	**227**
Machinery		**212**	**208**	**230**
Electrical Manufacturing		**256**	**252**	**244**
Automobiles, Trucks		**207**	**188**	**187**
Transportation Equipment		**219**	**214**	**252**
Other Metalworking		**240**	**239**	**236**

AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

*Estimated (p) Preliminary (r) Revised

Noticeable pickup has occurred in steel castings orders past two months. Source: railroad equipment builders, and variety of miscellaneous buyers. Growth of weldment business is causing concern, with steel castings firms looking for ways and means of broadening their markets.

• • •

Industrial fastener industry is running a little ahead of last year. Improvement reflects recovery from low months of November and December, both of which were affected by steel strike.

Demand for fasteners is called "good" from all sources. Highlights: automotive industry is yielding boom-time orders, aviation people and hardware makers are good customers.

• • •

Orders are slowing down in forging industry. Bookings are off about 10% from 1949, and business is very spotty plant by plant. Brightest segment is automotive. Some specific grades of steel are hard to get; otherwise enough steel is at hand to meet forger's requirements.

• • •

Diesel-electric locomotive business still is booming. But backlogs and delivery dates, particularly at Electro-Motive Corp., have been reduced by increased productive capacity. Incoming orders reported "satisfactory." There is no selling "on time," as banks are willing to pick up paper from railroads.

• • •

Makers of railroad passenger cars are hopeful that drought of new business, which held throughout 1949, will end shortly. Edward Budd is trying to lick problem by introducing "diesel rail cars" for which it has some orders with others pending here and abroad. Freight car orders are on upswing.

• • •

Farm equipment business this year probably will be 10-15% under last year (which almost equaled 1948's all-time record). Only one large company reports first-quarter volume up to or larger than year ago.

Competition is back in full force. Farmers are shopping around on price and quality before buying. What's more, number of farmers buying on time is growing, a reversal of situation since war.

Drought in Kansas and Texas will have bad effect on sales of combines and other wheat harvesting machines. But it may lead to purchases of machines for other crops. Dealers in some of the affected areas need help and may have to be carried by manufacturers. Farm dairy equipment is slowest line in farm field.

WEEKLY BUSINESS INDICATORS

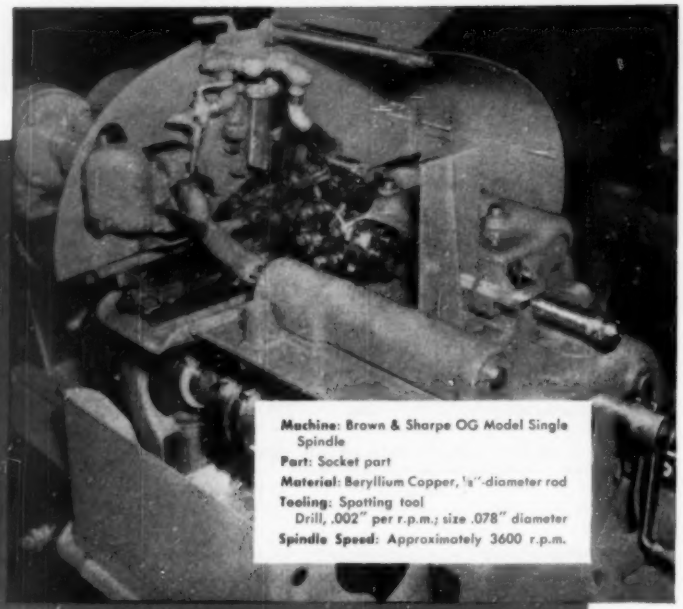
	Latest Week	Preceding Week	Year Ago
Business Week index of activity (1923-1925 = 100)	202.8	202.0	193.4
Steel ingot operations (% of capacity)	100.0	97.8	98.4
Electric power output (million kilowatt-hours)	5863	5898	5343
Production of automobiles and trucks	147,657	133,172	131,821
Engineering construction awards (Eng. News-Record; millions)	$185.7	$177.6	$107.3

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production* (1935-1939 = 100)	180	183	189
Index of durable manufacturers production* (1935-1939 = 100)	207	209	225
Durable goods manufacturers' sales* (millions)	$7,572	$7,471	$7,757
Electrical machinery manufacturers' sales* (millions)	$ 788	$ 784	$ 716
General machinery manufacturers' sales* (millions)	$1,110	$1,072	$1,270
Durable goods manufacturers' new orders (millions)	$7,852	$8,377	$6,734
Electrical machinery manufacturers' new orders (millions)	$ 736	$ 841	$ 612
General machinery manufacturers' new orders (millions)	$1,236	$1,184	$1,016

*Seasonally adjusted.

3 TIMES LONGER DRILL LIFE and NO MORE STAINS*



Machine: Brown & Sharpe OG Model Single Spindle
Part: Socket part
Material: Beryllium Copper, ⅛"-diameter rod
Tooling: Spotting tool
Drill, .002" per r.p.m.; size .078" diameter
Spindle Speed: Approximately 3600 r.p.m.

WHEN this operation was performed with Texaco Cleartex Cutting Oil

FOUR major benefits resulted when the cutting coolant on the job described was changed to *Texaco Cleartex Cutting Oil:* (1) drills lasted three times as long; (2) uniform hole size was maintained; (3) staining of copper was eliminated; and (4) lubrication expense was reduced because *Texaco Cleartex Cutting Oil* can be used as both coolant and machine lubricant.

These benefits and economies are typical. Every day, in plants all over the country, Texaco Lubrication Engineers are helping to improve metal-working operations and reduce costs.

Texaco Cleartex Cutting Oil is just one of a complete line of Texaco Cutting, Grinding and Soluble Oils . . . designed to meet all operating conditions and assure better, faster, lower cost machining.

Let a Texaco Lubrication Engineer help you select the right coolants to assure these benefits in your plant. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

*Name of this Texaco user on request.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Make The Operator Your Ally

New machines help a lot of people. They aid management by cutting costs. They aid stockholders by making more money and creating larger profits to be distributed.

More than that, they are a boon to workers. And that means to individual machine operators.

BUT HOW MANY machine users and builders are telling the men who operate their machines about the benefits of machines to them? Precious few.

It is encouraging, therefore, to learn about the program of at least one well-known machinery builder.

He supplies a manual to every operator of his machines at the time of installation. The manual has a foreword which reads, in part:

"NEW MACHINES are like any other new development. They result in a more prosperous and comfortable life for you and me.

"New and faster ways of machining cause further improvements in design and lower prices of automobiles, refrigerators and all of the many other products that we produce and consume to make our standard of living the highest in the world.

"Your new machine is proof that your employer recognizes this simple economic truth."

The foreword then says that management is doing its part to keep industry strong and productive. But final responsibility rests with the operator. This bulls-eye statement is:

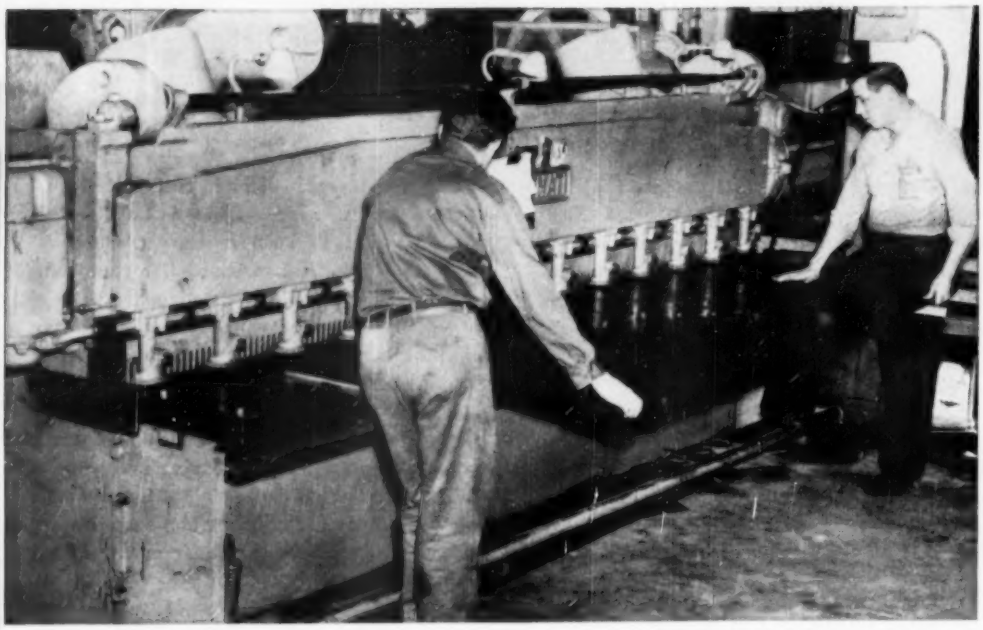
"Whether we can keep our country healthy and prosperous depends as much upon you, as one member of a large group that operates the tools of production, as it does upon your employer who makes these tools available." Such straight-from-the-shoulder educational work is badly needed. It will help to offset the economic pap being fed machine operators from other sources that machines are their enemy rather than their friend.

THIS PROGRAM won't go far, however, if confined to a handful of companies. It should be taken up and pushed by every machine user and every machine builder. And the program should be broadened. It should go far beyond the selling effort contained in the foreword to an operator's manual.

The operator can be a real help or a serious hindrance in getting out of a new machine what it is capable of producing. It is time to recognize that fact and spend some effort in convincing him that it is to his own best interests to be your ally.

Burnham Finney

Building THE HOME OF THE HAMBURGER!



Accurately shearing 96" enameling sheet.

Photos—Courtesy White Castle System, Inc.

The steel building is here, and in increasing demand. Cincinnati all-steel shears helped produce the all-steel building—and made prefabrication practical.

White Castle System, Inc., was energetic in the development of prefabricated steel buildings. They recognized early that prefabrication calls for duplication of units, and duplication rests on accuracy.

Cincinnati All-Steel Shears shear the panels and shapes for White Castle to thousandths of an inch—smoothing subsequent assembly and keeping down costs—for the cheapest blank is the accurate blank.

Write for Catalog S-5 on Cincinnati Shears—the shears of accuracy.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

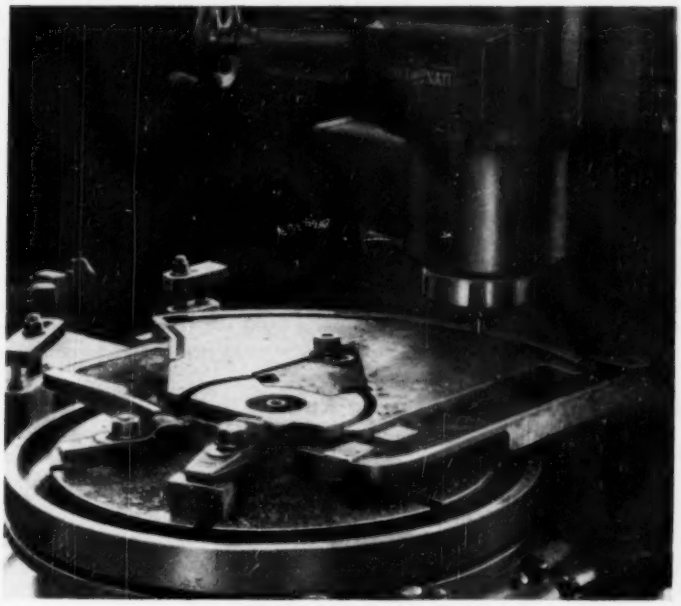


Fig. 1—Milling a circular T-slot on a cast-iron part, using a fixed-bed type milling machine equipped with a circular milling attachment

HOW TO MILL CYLINDRICAL SURFACES IN THE TOOLROOM

BY MARIO MARTELLOTTI
CINCINNATI MILLING MACHINE CO.

Toolroom milling of cylindrical surfaces requires the flexibility obtained through suitable machines and attachments . . . By an appropriate equipment combination and the methods and formulas presented, accuracy and output are realized

Milling a Circular T-Slot

THE SETUP is made on a fixed-bed milling machine, Fig. 1, using a circular milling attachment for rotating the part. In this setup, the piece is centered on the table of the attachment, which is first centered on the cutter axis and then displaced radially to locate the centerline of the T-slot at the required radius.

The T-slot is milled in two operations. Using an end mill of the required diameter, the center slot is milled in the first operation. In the second operation, a T-slot cutter is used to complete machining of the T-shaped section of the slot. Cuts are taken by rotating the table of the attachment at a speed equivalent to the feed which would be used if the milling were done on a straight T-slot by feeding the machine table.

In this case the table of the circular milling attachment is driven by an independent motor drive, but is usually driven direct from the machine feed drive. For a given speed of table rotation, the surface speed changes proportionately with the distance of the milling cutter from the center of rotation of the attachment table. In the latter case, the machine table-feed setting does not correspond to the surface speed of the attachment table except at a certain radius, which can be determined from the known ratio of the drive from the machine leadscrew to the circular table.

In the 20- and 24-in. circular-milling attachments, the surface speed for the attachment table at 6-in. dia is approximately equal to the rate shown on the feed dial

Abstracted from the book "A Treatise on Milling and Milling Machines" to be published by the Cincinnati Milling Machine Co.

setting of the machine. For the 16-circular attachment, the feed given by the feed dial setting is approximately the same as the surface speed of the circular table at a 9-in. dia.

In every case, to avoid too high a work speed, which may result in overloading and breaking the cutter, the table surface speed should be checked at the diameter where the milling operation is performed. If desired surface speed and diameter are known, the required dial setting can be obtained by means of the formula:

$F = CS/D$, where:

F = machine dial feed setting, in. per min

C = constant of the attachment ($C = 6$ for the 20- and 24-in tables; $C = 9$ for the 16-in. table)

S = desired table surface speed, which is the same as the selected feed rate in. per min

D = diameter at which the milling operation is performed, in.

The feed dial setting will be that corresponding to the nearest value of the calculated feed F.

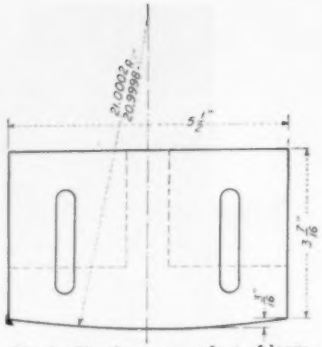


Fig. 2—Circular cam surface of large radius can be milled by the incremental setting method

Milling Cylindrical Surfaces of Large Radii

IN SOME jobs, the radius of the surface to be milled is too large to be accommodated within the range of the circular milling attachment. In such cases, the cylindrical surface can be milled by incremental settings, or by providing a temporary setup which will permit swiveling the workpiece at the required radius. An approximate radius can be produced by tilting the milling cutter.

When using the incremental setting method, a table of increments is prepared, so that the spacing of each setting is sufficiently close to leave only small ridges on the milled surface. These ridges are easily removed by polishing. If the incremental settings are not given in the drawing of the part, they can be calculated.

Selection of Setup

The cam surface, Fig. 2, is to be milled to a radius of approximately 21 in., which is beyond the range of the 12-in. radius obtainable with the 24-in. circular milling attachment.

An extension may be attached to the 24-in. circular table in the form of a subplate projecting 12 in. beyond the periphery of the circular table. The cam blank can then be clamped to the plate at the required radial distance from the center of rotation of the attachment. The subplate should be supported at the outer end by a rest block, which will permit circular sliding motion and at the same time maintain the cam blank in proper relationship with the cutter during the milling operation.

The accuracy of the milling operation may be affected unless proper care is taken to obtain a rigid setup. Using a 24-in. circular table, it is possible to mill a circular surface of the given radius in a succession of incremental settings by swiveling the blank through a smaller radius than the given radius.

The cam blank is centered on the circular table of the attachment and clamped so that the cam surface can be swiveled around the center A, Fig. 3, at radius R, which is less than the 12 in. radius of the circular table. The center B of the cam surface will be located in relation to the center of swivel A.

If the cam is swiveled counterclockwise to an incremental angle a and around center A of the circular table, point D on the circumference of radius R will move into position D', while point C on the cam surface will move into position C', and point E (the intersection between tangent DE to the circle of radius R, and radial line BE normal to DE) will move into position E'.

Point C' will then be at a horizontal distance $D'E' = DE = d$ from point D', and at a vertical distance $CE = C'E' = i$ from point D'.

The radial line BC will have moved to position $B'C'$, parallel and equal to radius BD'.

Point C' is the point on the cam surface to be produced next to point D'. Point C' is now located so that

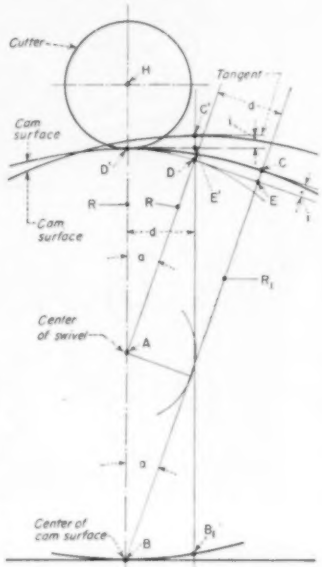


Fig. 3—Diagram for determining incremental settings for a cam surface produced on a large radius

Table 1
Values of i and d for Different Values of the Angle of Swivel a, for the Part Shown in Fig. 2

$R = 10.500$ in. $R_1 = 21$ in.

Angle a (deg.)	i	d
1	0.00157	0.183
2	0.0064	0.366
3	0.0144	0.548
4	0.0256	0.732
5	0.040	0.925
6	0.0575	1.097
7	0.0782	1.279
7° 30′ 30″	0.090	1.325

the tangent to the cam surface at C is at right angles to the line of center BH. This condition is necessary to avoid having the milling cutter undercut the cam surface. By making the lateral and radial adjustment d and i, the cam blank will be placed in position with respect to the cutter to mill the cam at point C', which is one of the points on the cam surface to be milled.

For any other point on the cam surface, similar conditions will apply. Hence, the circular cam profile can be milled at the given radius by setting the cam blank in successive positions determined from the value of the angle a and the values of d and i, which are calculated by means of the following formulas:

$$i = (R_1 - R)\ (1 - \cos a)$$
$$d = (R_1 - R) \sin a$$

where:

i = radial setting of cam blank, in.
R_1 = radius of cam surface equal to BC.
R = selected radius of swivel, equal to AD and AD', used in the setup, in.
a = angle of swivel, deg.
d = lateral setting of cam blank, in.

The incremental value of a from one setting to that immediately following should be sufficiently small so that ridges between consecutive points on the cam surface are very shallow.

If the preceding formulas are applied in the case of the cam shown, the incremental settings i and d for each value of the angle a are shown in Table I for the given setup radius $R = 10\frac{1}{2}$ in. These settings are for one-half of the cam surface. The other half of the cam surface is obtained by using the same values, but by swiveling the cam blank in the opposite direction and also by changing the direction in which the lateral adjustment d is made.

Milling Procedure

The centerline of the cam blank is located so that it will pass through the center of rotation of the circular table of the attachment, and at a distance of $10\frac{1}{2}$ in. from this center to the cam profile, as shown in Fig. 4.

A high-speed-steel end mill of 1-in. dia is inserted in the spindle of a vertical milling attachment on a plain knee-type milling machine. The centerline of the workpiece is now aligned with the center of the cutter.

If the range of the machine will permit, it is preferable to locate the workpiece in front of the cutter. If this is not possible, the setup can be made by locating the workpiece and the supporting means laterally. In this way, the centerline of the cam is aligned with the longitudinal movement of the table.

In either case, proper attention must be given to the slide, which must be moved in making the incremental settings.

The work is adjusted to the required depth of cut when it is in the centralized position, as shown in Fig. 4. This is done by moving the saddle or the table of the machine, depending on the location of the workpiece with respect to the cutter. The micrometer dials are then set to zero reading, and this is used as a reference in making subsequent settings. The settings are read from a tabulation such as that given in Table I.

Cylindrical Surfaces Milled by Tilting the Cutter

LARGE RADII on shallow concave surfaces can also be milled to approximately the required radius by tilting a milling cutter or a fly cutter at an angle C with respect to the surface to be milled, as illustrated in Fig. 5.

The cross-section of the milled surface is an arc of an ellipse. When the chord is narrow or the depth of the arc is shallow, the arc of an ellipse closely approximates the arc of a circle, and in certain applications the accuracy obtainable with this method may yield satisfactory results.

In general terms, if the cutter of diameter D is tilted at the angle C with respect to the workpiece, the arc of ellipse will be HK (Fig. 5), having a minor axis b and a major axis $D/2$, equal to half the cutter diameter.

If R_c is the given radius of the cylindrical surface BA to be milled, which has a chord W and depth h, the arc of ellipse for the same chord will have a depth $h + t$ (Fig.

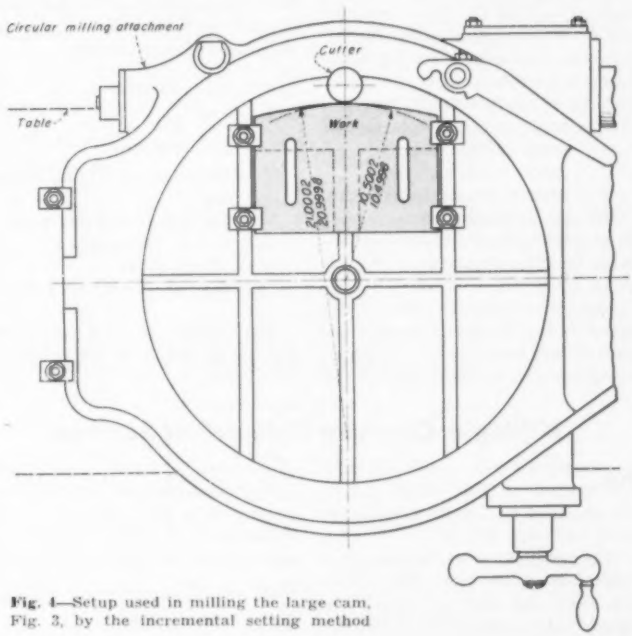


Fig. 4—Setup used in milling the large cam, Fig. 3, by the incremental setting method

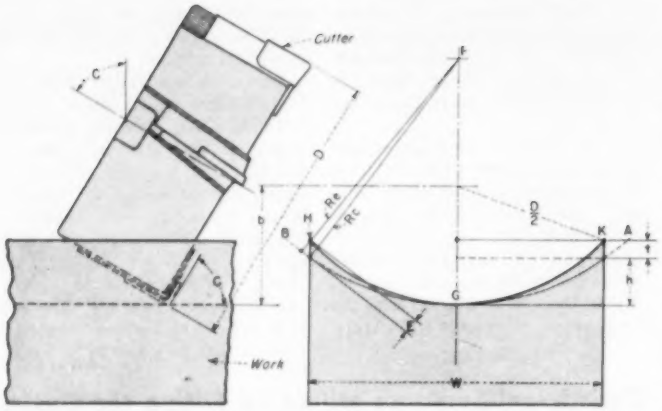


Fig. 5—Angle of tilt of a milling cutter for milling large radii

5). Consequently, the distance R_c from the center F to point H of the elliptical arc will be short of the desired radius R_e by an amount E.

Since it is not possible to have E and, consequently, $t = 0$, it is therefore necessary to accept a minimum for the value of t. This determines the deviation of actual radius R_c from the desired radius R_e. This is the value of the radius of the resulting surface obtained only at point G; at any other point, the actual radius will be less than the desired radius R_e. The angle of tilt C of the cutter is calculated, however, by means of the following formula for the value R_c of the given radius: $\sin C = D/2R_c$ where

C = angle of cutter with axis of work surface, deg.
D = cutter diameter, in.
R_e = desired radius of surface, in.

For any selected cutter diameter D and radius R_e, the preceding formula permits calculation of the tilt angle C.

Maximum deviation between the actual radius R_c and the desired radius R_e will be obtained at point H, corresponding to the width of the chord W. The value of R_c at this point can be calculated as follows:

First, it is necessary to know the value of t, or the amount which the depth of the actual arc deviates from that of the desired arc. From the geometry of Fig. 5, t can be expressed as a function of the given values, thus:

$$t = \frac{\sin C \left[D - \sqrt{D^2 - W^2}\right]}{2} - h$$

Now, the value of radius R_c between G (center of the arc) and point H on the arc can be calculated by means of the formula:

$$R_c = \sqrt{(R_e - h)(R_e - h - 2t) + \frac{W^2}{4}}$$

In these formulas:

C = tilt angle of milling cutter, deg.
t = increase in arc depth, in.
D = cutter diameter, in.
W = chord of arc, in.
h = desired depth of arc, in.

Application of the foregoing method is shown in the following example:

Milling a Concave Cylindrical Surface

MILLING a 3½-in. radius concave surface of 3 in. chord and ⅜ in. depth of arc, using a 4-in. dia shell end mill, Fig. 6.

The workpiece is clamped in a milling-machine vise. The 4-in.-dia shell end mill is held on the spindle of a motor-driven, universal-milling overarm attachment. The setup is made on a plain knee-type milling machine.

Angle C at which the milling cutter must be tilted is calculated thus: $\sin C = \frac{4}{2 \times 3\frac{1}{2}} = 0.5714$

Hence: $C = 34°51'$.

With the cutter axis centered on the workpiece, the spindle of the attachment is now tilted in the vertical plane so that the included angle between the face of the cutter and the top surface of the workpiece is 34°51′.

By hand feeding the knee, contact is then made between work and cutter. This gives the initial zero setting on the micrometer dial. After this, the table is moved so that the workpiece clears the cutter.

Several passes are taken until the chord of the arc of the concave surface measures 3 in. At this width, the depth of the arc will be somewhat greater than the desired value of ⅜ in. If the arc depth should be machined within close tolerances of the given value then the width of the chord should be correspondingly reduced (Fig. 5).

The difference between the actual and desired depth of arc for a chord of 3 in. width can be calculated by means of previously given formula for t:

$$t = \frac{\sin 34°51' \left[4 - \sqrt{16 - 9}\right]}{2} - \frac{3}{8}$$

$$= 0.012 \text{ in.}$$

Radius R_c can now be computed:

$$R_c = \sqrt{(3.500 - 0.375)(3.500 - 0.375 - 0.024) + 9/4} = 3.455 \text{ in.}$$

Hence, the maximum difference between the desired 3½-in. radius obtained at point G and the radius at point H or point K is 0.045 in.

Another installment on the Martellotti book will be published in an early number.

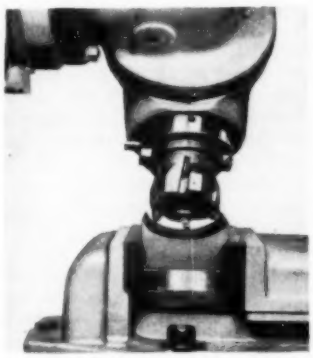
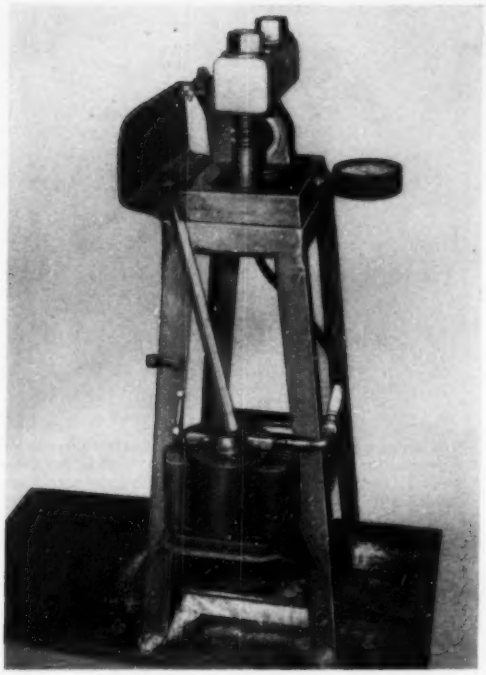
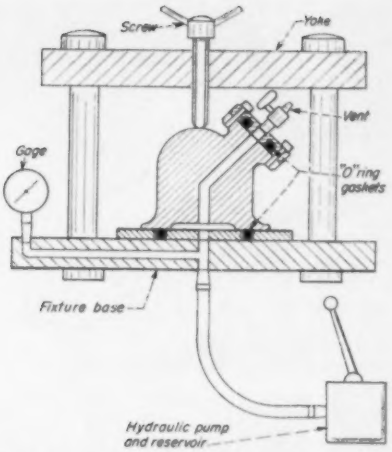


Fig. 6—Setup for milling a concave cylindrical surface of 3½-in. radius by tilting the cutter





Casting is clamped into fixture strong enough to stand the pressure. Hand pump has 0.56-cu in. displacement per stroke. Cavity in casting is 6 cu in., so at 50 strokes per min it takes only 13 sec to test after clamping. All air must be expelled through vent at highest point

Hydraulic testing fixture for steel cylinder-head castings checks to 2000 psi. Such tests can easily be made to 5000 psi. The hand pump used here is rated at 2500 psi

Simple Hydraulics Solves Shop Problems

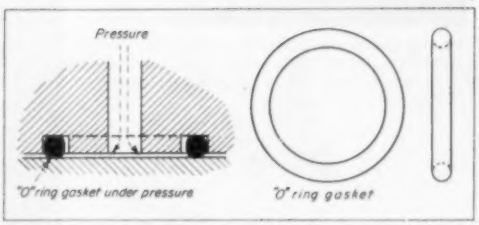
BY H. G. FROMMER

HYDRAULICS can be rather involved where it deals with complex machinery. Yet the average shop has many problems that can be solved speedily and economically with simple hydraulic devices.

Jacking, pressing, spreading, pulling and testing can often be performed faster and with less personal effort with a hydraulic pump. Tooling can often be better designed with hydraulic clamping arrangements than with mechanical or pneumatic clamps.

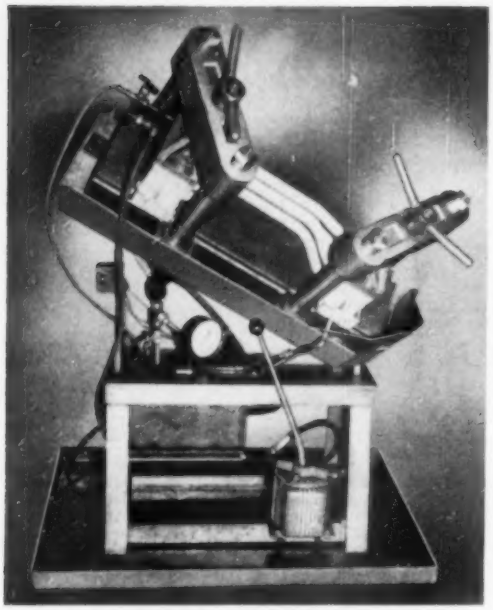
Here are examples that show the possibilities. One of the best ideas is the wheeled cart with a hand pump and assorted rods. It will handle a variety of jobs that require spreading, pushing, or jacking. Originally devised for setup work in the welding department, it has proved its usefulness by increased production.

Striking savings in assembly time may be possible with a hydraulic ram for forcing and pressing, when the work is not easily put in a press.

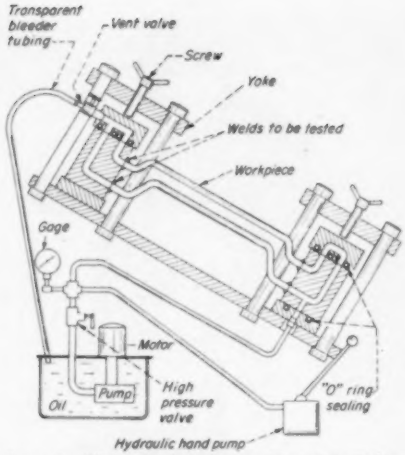


Quick, effective seal required for testing is provided by O-ring gaskets Normally of circular section, they are forced out of shape by hydraulic pressure to seal joint

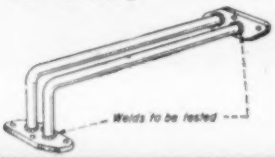
PLEASE TURN PAGE



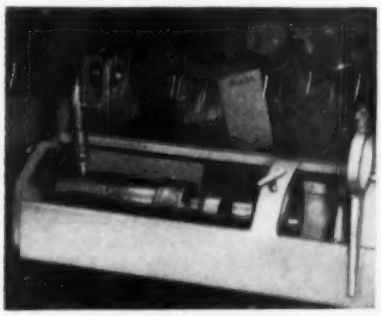
Testing steel weldment of blocks and tubes is done with this special fixture. Fixture is tilted to avoid trapping air as weldment is filled with oil and to provide high point for the air vent



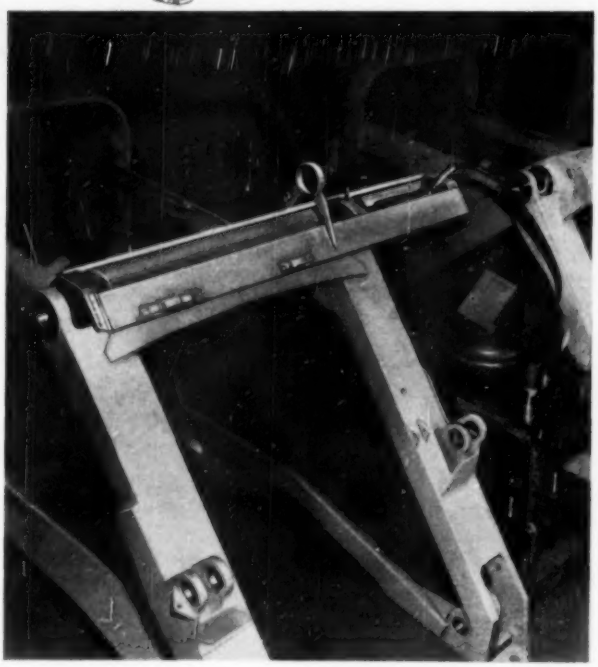
Too large to fill by hand pump, weldment includes two steel blocks with oil passages and four connecting tubes, a total cavity volume of 130 cu in. A ½-gpm gear pump, designed for coolant, is electrically driven to force oil into cavities from bottom until it flows from vent and is free of air bubbles. Transparent tubing returns this oil to tank. Once filled, and vent and inlet valves closed, it takes only a few strokes of hand pump to build up pressure for testing



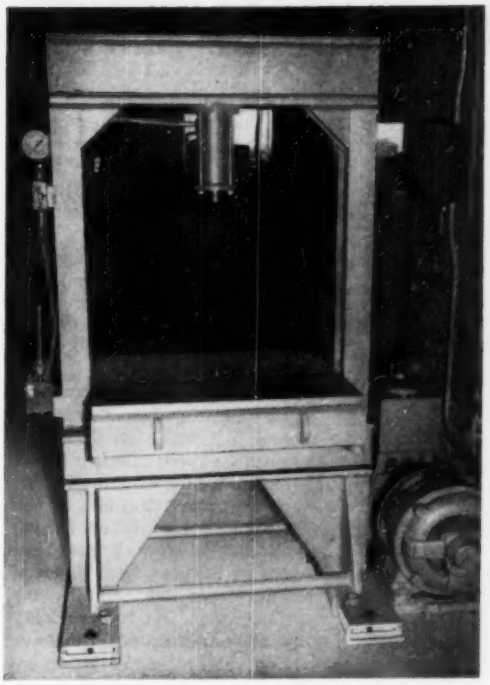
Tube assembly of different design can be tested in the same fixture by changing the adapter plates. After test, compressed air can be applied for fast drainage



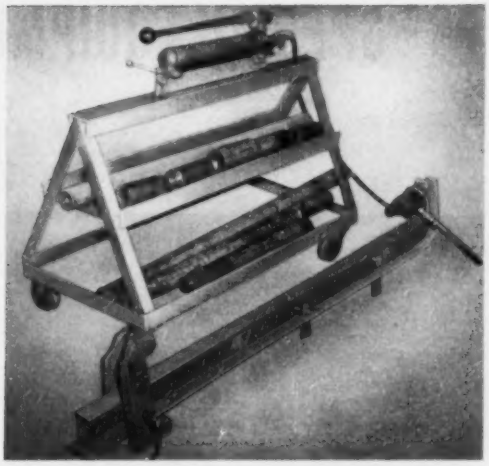
Twenty-ton ram is mounted in simple fixture designed to fit the weldment. Pump delivers 27 cu in. per min, which gives a ram speed of 6 ipm



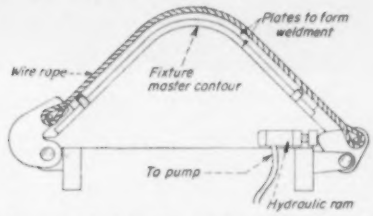
Portable pump in assembly line presses four 2¾-in. bushings into a large weldment. Shape of the weldment made it awkward to do the job on a shop press. Using a hydraulic ram saved 75 min assembly time per piece



Homemade press met a tooling deadline when a press of the required odd dimensions could not be delivered in time. Body was made by welding plate and bar, and equipped with a 50-ton ram with built-in spring return. A 10-hp motor drives a 2-gpm pump rated at 8000 psi, giving a ram speed of 35 ipm. A single-acting valve with an overload safety device is the control



Hydraulic first-aid cart takes care of many odd jobs around the plant. It includes a hydraulic hand pump with 10-ton ram and rods of various lengths to make the necessary setups. This cart became so popular that several are now in use. The adjustable C-clamp serves to convert the ram pushing action to pulling action



Clamping curved plates for welding when they have lost their shape in storage requires steel cables to force them against the fixture contour. A hand pump and hydraulic ram is a simple way to tighten the cables

Tips FOR TOP SHOP MEN

332 What you say and what you write must agree. You can't post a memorandum that lays down a policy, then nullify it by word of mouth—and vice versa. If you do, the least criticism you'll get is that you're changeable-minded. And charges that you're two-faced and a liar are more likely.

333 Despise the political maneuver called "damnation by innuendo". The apparently innocent question, "Does Johnson beat his wife?" is just as harmful to Johnson in the long run as your positive statement that he does. Watch remarks like "Is Smith slipping?", or "Is Jones' health poor?", unless you have a malicious desire to see the thing happen.

"He just ruined $16,000 worth of lockwashers."

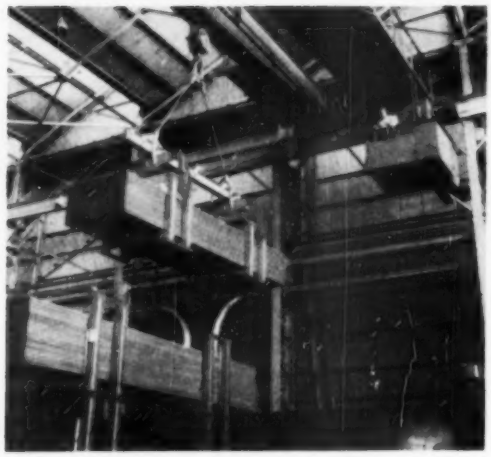
SPECIAL EQUIPMENT HANDLES HEAVY

BY A. I. NUSSBAUM
Mond Nickel Fellow, London

FRACTIONATING columns, heat exchangers, cracking units, and similar large tubular units fabricated by welding, introduce some difficult problems in handling. Conventional practice has been to fabricate the various sections in the shop and assemble them on the site. This necessitates shipping a considerable amount of welding and other assembly equipment and personnel, setting up a fairly extensive temporary shop, and frequently involves difficulties in obtaining adequate welding current. Further, 100% inspection of field-welded joints is difficult and costly, sometimes impossible.

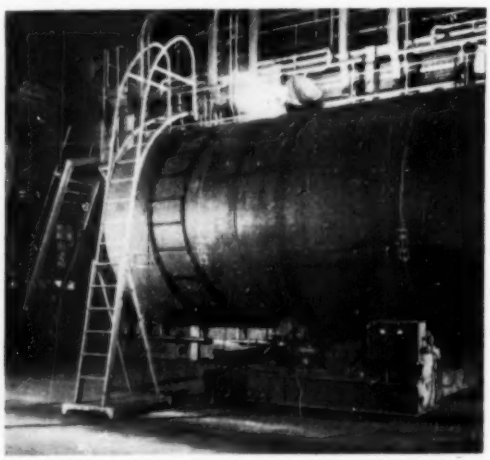
In contrast to this, C. F. Braun & Co., Alhambra, Calif., within the limits of transportation facilities, fabricates and assembles in its own shops, and is thus able to meet the need for speed inherent in the demands of the petroleum industry. Units are as large as 14 ft in dia and well over 100 ft long, hence any manual handling is out of the question. Standard cranes, hoists, trucks and lift trucks are used for ordinary lifting and hauling, but considerable special equipment has been developed for handling the heavy plates during fabrication and for providing rotational and longitudinal movement of the massive cylinders during welding.

As shown in one of the accompanying illustrations, the main factory building, covering eight acres, is divided into major areas according to the main classes of operations, and work can be routed through any or all departments as required.



Heat-exchanger tubes are stacked in groups required for each order and labeled with respective order numbers. Special racks have angle-section bases and tops for stacking to maximum crane height. When needed on assembly floor, the already counted and assigned batch of tubes is picked up in its rack and carried to position

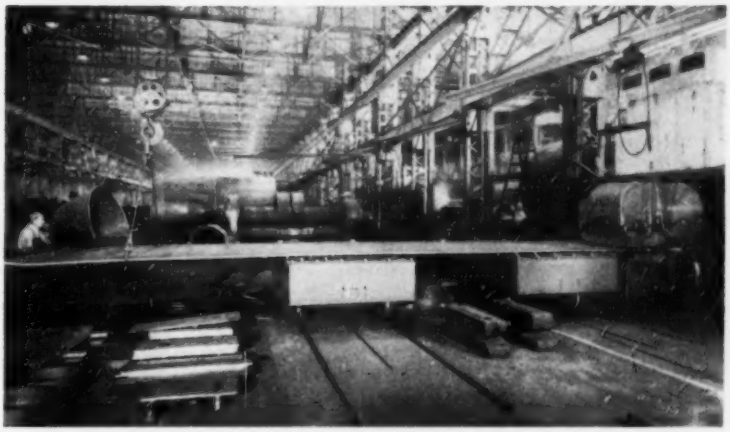
Ingenious use is made of a high-lift fork truck equipped with a fixed jib attached to the lift platform. No crane cable is required as the hook is attached to the end of the jib, and hoisting is by the truck lift mechanism. This arrangement finds wide use in building construction inside and outside the plant



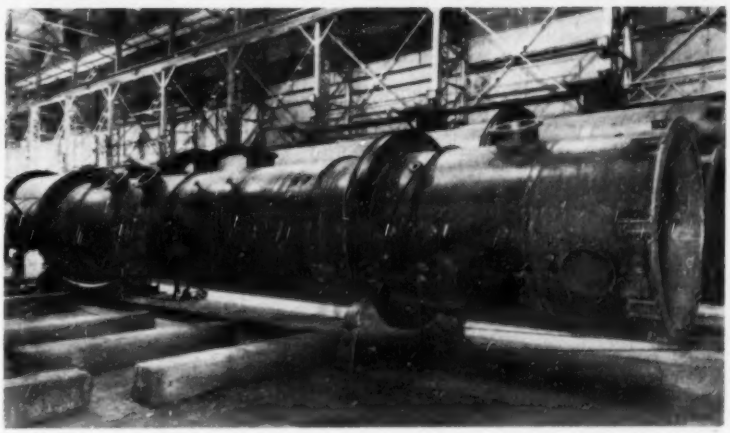
Steel ladders, mounted on substantial bases and readily movable to any position, are adjustable in height for maximum safety and convenience of welders. Automatic rotators for turning the work at constant speed are mounted on tracks for positioning at any desired point on long columns and towers

COMPONENTS

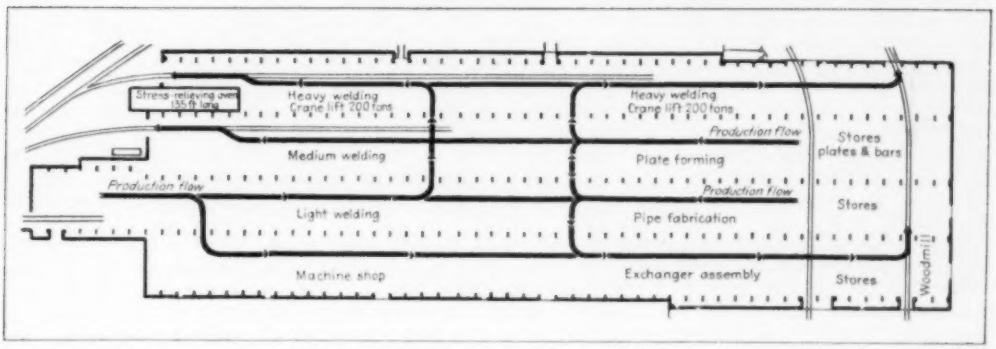
Steel tanks, pressure vessels and columns for the chemical and petroleum industries can be made efficiently with planned handling



Heavy steel plates are handled on ball-top transfer cars which serve the 350-ton and 750-ton crimp presses. This permits easy maneuverability and avoids taking up large amounts of valuable floor area with the conventional ball-top fixed support columns. Cars have flanged wheels and run on tracks let into the floor

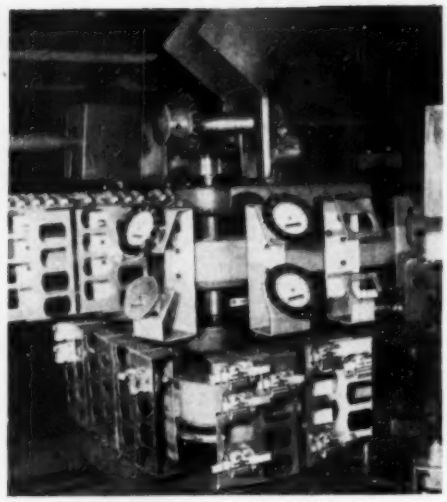


Support rings are temporarily bolted around vessels whose diameters are large compared to their wall thicknesses. This prevents squashing of the walls by the rotator rollers used to facilitate turning the work during welding operations and permits downhand welding with both manual and automatic equipment



Flow chart for the main factory building of C. F. Braun & Co. is designed for most efficient fabrication and handling of heavy weldments for heat exchangers, fractionating columns and similar large, awkwardly shaped units

Sheet-metal carriers, bolted to 3-in.-wide, 3-ply belts on vertical pulleys, are a feature of this two-level assembly conveyor. Each carrier has a rail-riding support roller to prevent its sagging between pulleys. Operator at this station mounts pointers on speedometer assemblies taken from top conveyor, then places assembly on lower conveyor at her right for transport



Cross-over belt at lower level carries frames across bench from odometer mounting section. After mounting and crimping face dials, operator places unit on upper belt and it is carried to next position. Conveyor in upper background serves opposite side of bench

TOOLED CONVEYOR SPEEDS

Planned workholders for belts reduce guesswork, handling, and transport time—

a unique improvement over straight-line carriers

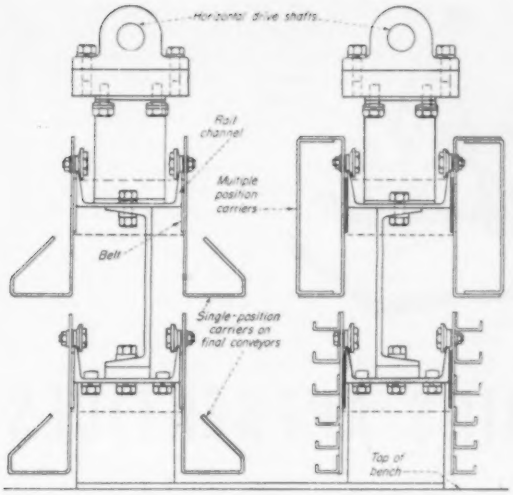
BY RALPH L. SCHIRMER, Plant Engineer STEWART-WARNER CORP.

AN UNUSUAL conveyorized assembly bench 110 ft long and 48 in. wide was recently put into operation at the Chicago Plant of Stewart-Warner Corporation. U-shape design provides 61 work stations, 33 on the starting side and 28 for finishing and calibration, specifically for speedometer assembly. The idea may be applied to a wide variety of similar operations. Expected production rate is about 500 units per hour, under ideal conditions.

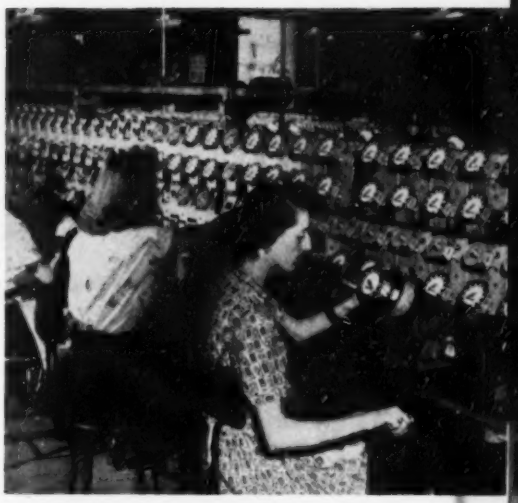
15 vertically positioned flat belt loops arranged in a two-level series divide the table through the center lengthwise. Each loop is equipped with sheet-metal carriers designed to hold the standard frames used in most speedometers. All belts operate at the same speed on straight-face vertical split wood pulleys driven, through two vertical pulley shafts miter-geared to two horizontal lineshafts, by a single 3-hp motor at the table center. A variable-speed drive pulley on the motor coupled through a worm-gear speed reducer provides a belt speed range from 13.24 to 39.75 fpm.

Belts overlap, above or below at each end, thus parts may be readily transferred from belt to belt at each work station. First and final operations are at the same end of the bench and each conveyor, except the one at the crossover, serves only one side of the bench. The crossover belt operates on four pulleys rather than the normal two, thus eliminating the need for trays or tote boxes to transfer units across the bench. Correct belt tensions are easily maintained, as each vertical shaft has a separate tension adjustment and only two of the upper and lower belts have pulleys on the same vertical shaft. Bench tools are readily interchanged as required. Four models have been assembled simultaneously, but handling of one or two at a time produces a more efficient result.

A 2-hr supply of assemblies ahead of each work station is provided by the conveyor-section length, hence employees may operate more than one station when work load is low. Also, difficulties at one station do not prohibit continued operation at the other positions.



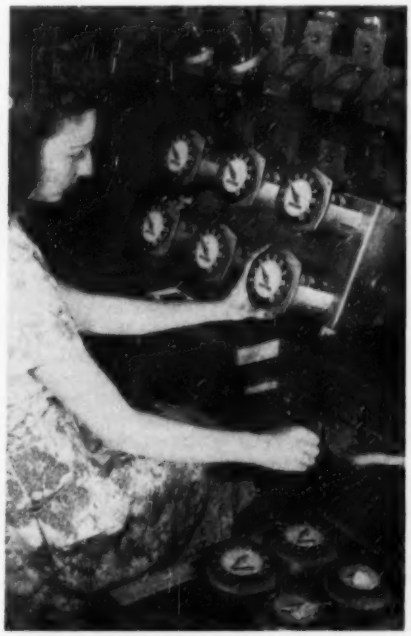
Parallel upper and lower conveyors serve opposite sides of the bench, and usually have different carriers. Rollers support each carrier except when riding over pulleys at each end of belt



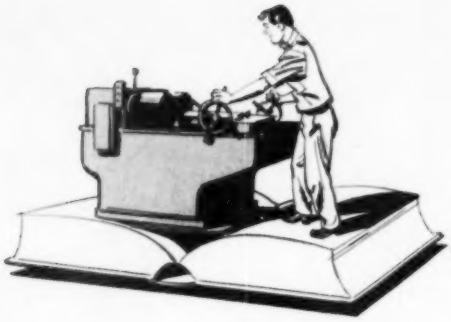
Slow operations, such as calibration, are compensated by providing extra stations on the appropriate side with identical fixtures. Here, eight stations on the finishing side are equipped with calibrating fixtures. Lower conveyor delivers assemblies; upper one delivers checked units to next operation

LINE ASSEMBLY

Power screwdriver is controlled by small MicroSwitch in each of two driving positions. Fixture, loaded at last previous station, arrives on horizontal 6-in. conveyor belt and is shifted until its base activates first switch. After first screw and lockwasher are set, fixture is pushed forward against second switch and the other screw is driven. Latch near operator's finger helps align fixture with second switch. Cold-rolled strip edges minimize wear on aluminum fixtures. Slots in table carry screws which fall from hopper or drive to recovery pans



Inspector checks six units at a time, selecting them from lower conveyor. Satisfactory units go to upper conveyor; others are placed in trays for adjustment, after which they will return on lower conveyor



HOW BRITAIN TRAINS APPRENTICES

A comprehensive program is worked out for all types of apprentices, and even college graduates must put in at least a year in the shop

BY A. W. BERRY
BRITISH ENGINEERS' ASS'N, LONDON

IT IS A CURIOUS FACT that British-trained engineers and machinists appear to be able to obtain employment in the U. S. with a minimum of difficulty. The reason is not far to seek; American employers are fully aware that a man who has served an apprenticeship in Britain has been thoroughly trained by competent instructors in his particular field.

This does not mean that American engineers are not as good as the British, but it cannot be denied that the young British engineer has, as a general rule, received a more thorough training in both the practical and theoretical aspects of his profession. It is lamentably true that all too many American engineering graduates have never seen the inside of a machine shop, and can recognize a lathe or milling machine only by its resemblance to an illustration in a textbook.

The young British engineer, on the other hand, has spent at least a year in practical machine-shop work. Admittedly, some American colleges have excellent practical courses, and some offer cooperative training whereby a student's time is divided between school and industry. And graduates from such schools rarely experience any difficulty in obtaining suitable employment. Unfortunately, such training appears to be the exception, rather than the rule, and employers must frequently bear considerable expense before the young engineer is really earning his way.

As far as craftsmen are concerned, a similar situation exists. It is true that many American firms have proper apprentice courses, some of which are fully equal to the best British courses, but there are not nearly enough to maintain an adequate supply of really skilled workers. And although there is a steady growth of automatism in production equipment, mass production still accounts for only about 10% of all American output, and automatic equipment always demands highly skilled men for setup and maintenance and, of course, for the construction of the machines themselves.

At the present time Britain is facing an acute shortage of craftsmen because a whole generation of apprentices has been skipped by six years of all-out war. She is now making a determined effort to remedy this situation and to attract the right type of youth into the engineering trade and profession. The British Engineers' Association is taking an active part in this campaign and is enlisting the support of school headmasters and vocational guidance masters.

The traditional system whereby the apprentice paid the employer a premium, often substantial, for the privilege of receiving training, has now virtually disappeared. Instead, he is now paid a small wage or salary depending on his age and length of service. This has made it possible for a boy of real potential ability to overcome the handicap of lack of funds, and to receive first-class training in craftsmanship, while at the same time relieving his parents of the burden of his support during his adolescent years. On the other hand, it has effectively curbed the few rapacious employers who regarded apprentices as a source of revenue and cheap labor.

Most companies now select apprentices with considerable care through the medium of a selection committee consisting of the various department heads and the apprentice training supervisor. The candidate is usually taken through the plant and given an opportunity to talk to some of the senior appren-

tices, and to see the kind of organization he will enter and the type of work he will be expected to do. He is interviewed by one member of the committee for purposes of assessing his intelligence, initiative, general knowledge and appearance, but the final choice is made by the committee as a whole. Aptitude tests are being used to an increasing extent and are proving extremely useful in helping the committee to reach a decision. In addition, many companies give the prospective trainee a probationary period of 6 mo before entering into a formal apprenticeship agreement. If during this period, which counts as part of the apprenticeship, he finds the work congenial, he can continue with a reasonable assurance that he has selected the type of career he really wants to follow. And at the same time, the employer is more satisfied that he is likely to turn out a useful engineer.

Types of Apprentices

Three types of trainees are accepted, depending upon age and circumstances. The trade apprentice is taken at about 16 and trained for 5 yr as machinist, toolmaker, or pattern maker. During this time he attends school, usually one day a week, either at a company school or the local technical college, and is expected to pass examinations for a craftsman's certificate or the Ordinary National Certificate. If he wishes, he can, of course, continue his studies for the attainment of the Higher National Certificate. This is entirely voluntary, but gives him a distinct edge for promotions later on in life.

Student apprentices are taken at about 17 and must have passed the school certificate examination with credits, especially in mathematics and science. The training period lasts 4 yr. The first 2 yr are spent in the shop, and the student usually spends about 3 mo in each department—sufficient to give him a good grasp of the work without necessarily equipping him with the detailed skills essential to the craftsman. During this time he is expected to pursue technical studies up to at least the Higher National Certificate standard. This part of the training is designed to give him a broad shop experience and a certain degree of manual skill, combined with a knowledge of the possibilities and limitations of various processes. At the same time it gives him an appreciation of the great importance of human relations in industry and develops a sense of personal responsibility.

The final 2 yr are intended to familiarize him with the technique and organization involved in designing, developing, manufacturing, installing, and operating engineering equipment. At least 3 mo are spent in the drafting room or, in large plants, in that part of the drafting section dealing with the particular product and type of work on which he expects to be employed. He is introduced to the problems of production control, design, and office administration, and usually selects some particular department in which to specialize.

Graduate apprentices are selected from those who have already obtained a degree in science or engineering from a university, or hold a technical college diploma. In these cases the training period lasts from 2 to 3 yr and is again divided into two parts. The first portion is spent in the shops acquiring a basic mechanical training, the remainder being in the offices and administrative departments. The shop period is shorter than in the case of student apprentices. Some companies prefer to have the graduate apprentice spend a year of mechanical training before entering the university, but in most cases it is usual for him to begin his practical training after he has taken his degree.

Supervision of Training

To insure success of the training program, a supervisor of apprentices—usually a professional engineer—is given the job of seeing that the training scheme is adequate and that proper supervision is exercised over the apprentices during their training. He has a wide knowledge of the types of employment available in the plant and can advise apprentices on their problems, and keep department heads informed of possible candidates for employment. He supervises the work and conduct of the apprentices, makes sure they are attending the prescribed school classes, arranges for their transfer to the various departments, and keeps tabs on absenteeism and punctuality. He obtains reports from the school principal and shop foremen, and interviews students whose marks or conduct are unsatisfactory. From time to time he also forwards progress reports to parents or guardians. Where apprentice associations exist, he urges the boys to join and keeps a watchful eye on activities to be sure that the general policy and practice of the association is kept in line.

Educational Program

While the primary purpose of apprentice training is to produce practical, working engineers and craftsmen, the importance of theoretical training is not overlooked. Some of the larger companies operate their own schools, but it is more usual to arrange for craft and student apprentices to attend the local technical college. The cost of part-time education in the technical schools is very moderate, even when borne by the apprentice himself. However, most firms make a practice of paying the fees, provided the student makes satisfactory progress. The emphasis is, of course, on engineering subjects, drafting, and mathematics, but English and the humanities are by no means overlooked.

University fees for graduate apprentices vary from $250 to $1000 for the entire course of 3 to 4 yr, depending on the particular school selected. Boys of good ability, however, can obtain financial assistance by scholarships. These are offered by the state and the engineering institutions, and many engineering

companies offer scholarships which may or may not be restricted to employees, and whose values vary from $500 to $1200 per annum.

Membership in the various engineering institutions is dependent upon examinations, and only members are entitled to describe themselves as Chartered engineers. To qualify for Student grade the applicant must be between 16 and 25 and must show that he is receiving or intends to receive instruction in mechanical engineering, and must pass the common preliminary examination.

For graduate membership he must be between 21 and 30, must be receiving or have received regular training as a mechanical engineer, and must pass two examinations. The first consists of papers in English, mathematics, applied mechanics and engineering drawing, plus two selected papers on either applied heat, principles of electricity, physics, chemistry or workshop technology. The second examination includes two papers on theory of machines, and properties and strength of materials, plus one selected paper on either steam or internal combustion engines, hydraulics and hydraulic machinery, electro-technology, metallurgy, aeronatics, or machine tools.

An associate member must be over 25, and in addition to being trained as a mechanical engineer, must have had sufficient experience in mechanical engineering, including a period in a responsible position. He must also pass the same examinations as for graduate member, plus an examination in industrial administration.

The full member must be 33 or over and is subject to the same qualifications as an associate, but must, in addition, have been engaged for a sufficient period of time in an important position of responsibility in either engineering science or practice.

IS THERE A ONE BEST WAY?

BY JOHN R. GODFREY

ONE of my pet peeves for lo these many years has been the notion that there is only one right way of doing a job—for the guy who preaches this is always sure that he has the only right way.

This does not mean that a strange workman should be handed a job and left to himself without any suggestions as to why it is handled in that shop. But even this might sometimes surprise the planners by having him develop an entirely new and better method. Of course, in a production shop each man is part of a chain and must fit into the other links both as to method and time. But there are many jobs where end results, rather than iron-clad sequences, count most.

I am a firm believer in motion study. It can and has done a lot of good. I've been in plants, some of them arsenals, where both men and women workers welcome the time-study man. My pet peeve is in expecting or demanding that every worker follow the same movement pattern in all operations. Certain deviations are more natural for some than for others, especially when it comes to right- and left-handed people. Then, too, some of us are so contrary-minded, or pig-headed, that we'd rather make a few extra motions than conform to an iron-clad pattern. Strangely enough, some of these non-conformists turn out more work.

Years ago, I was objecting to the attempt to make robots of workers when a motion-study advocate said: "I suppose you would let every man do a job in his own way.

To which I replied: "As far as possible I would, provided he produced the desired accuracy in the average time for the job. I'd go about it something like this: I'd say to the man: 'Here is the job to be done. Here are the tools we use for the job. Here is the standard time we get by doing it our way. I'd suggest you try our way first. Then if you find a better way, go to it. I don't care whether you use your right hand or your left. You can use your feet if it's easier for you. As long as you give us standard-quality work in our time, you can use any sequence of motions you please.'

"But," I said, "there is one sequence I would insist upon. He must drill a hole before he taps it!"

There are men and women who prefer routine work, according to a fixed pattern, so they become automatons and can think of last night's party or tonight's date. I saw a case of this in a motor plant where a man lay on a "creeper" as the chassis rolled over him. He tightened a couple of nuts as they went over. It seemed as monotonous as possible, and I asked the super how often he relieved the man. He laughed. "We tried that when he went on the job. He wanted to quit because he thinks it's the best job in the plant."

I've been forced to believe that this is all too true in too many cases. I do not believe it helps make good citizens. Men and women content with this are likely to be easily led into unreasonable demands. Whether they realize it or not, it may easily affect the absenteeism which raises hob with production schedules. This is undoubtedly true in the cases of workers who have had jobs in which they were keenly interested. The former small-shop man is sure to be irked by the monotony day after day and longs to go fishing or anything for a change.

We must have more and more automatic machinery for increased production. We must also find ways and means of creating interest in the job. This is one of the real problems of management, especially in large plants. Interest in the plant and its products can be stimulated in many ways, but it is a full-time job for intelligent men and women. One of the first steps is to counteract the trend in some systems of management to consider the operator as part of the machine. They must be treated as individuals who are part of the organization in which they should take a personal interest. Not from the "do-gooder's" point of view, but as sound business policy.

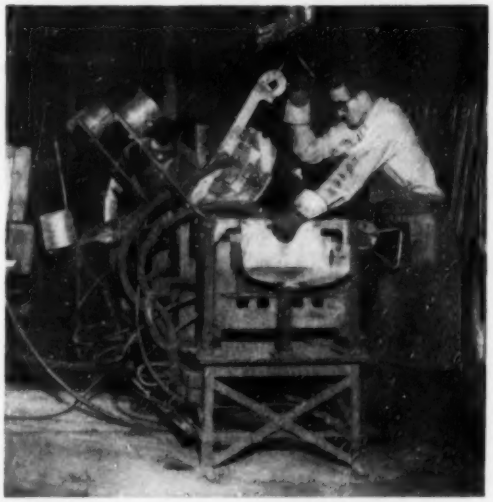
SPECIAL FIXTURE WELDS TRACTOR HOODS

BY HERMAN J. SCHAEFER, Methods Superintendent
Charles City Plant, THE OLIVER CORPORATION

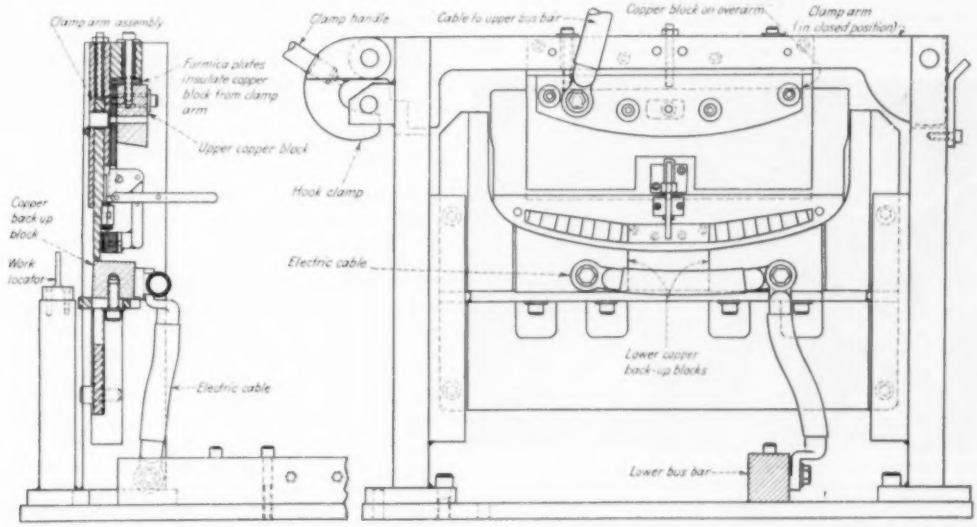
SHEET-STEEL engine hoods for Oliver tractors are assembled and spotwelded in a novel adjustable fixture developed at the Charles City plant of The Oliver Corporation. Designed for use with expansion guns, and using short lengths of 270,000-circular-mil, single-conductor, water-cooled cable to connect copper backup bars with busbars, this fixture is assembled on a ¾x30x79¾-in. steel baseplate which is supported on an 18-in.-high welded steel base to bring the fixture to convenient working height.

The long U-shaped hoods are inverted in four fixture nest stations, stamped stiffeners are held in the four overarm clamps which carry laminated plastic guides for the expansion-type welding guns, then the clamps are closed ready for welding. While one operator is working at these positions, the second operator uses a scissors-type spotwelding gun for mounting stiffeners and covers at the front end of the hood.

Some difficulty was experienced when the fixture was installed, because unsound weld spots were produced at some locations. These problems were eliminated when the fixture was brought into electrical balance by shortening a number of the secondary cable leads to the individual welding stations.

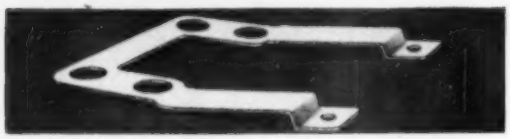


Stiffeners are located inside hood by overarm clamps. These assemblies carry toggle clamps with laminated plastic blocks which both hold stiffeners in place and are slotted to locate points of expansion gun for welds. Gun pressure is applied against copper block in center of overarm. Power is supplied from Taylor-Winfield, 100-kva, 440-v, 60-cycle portable transformer



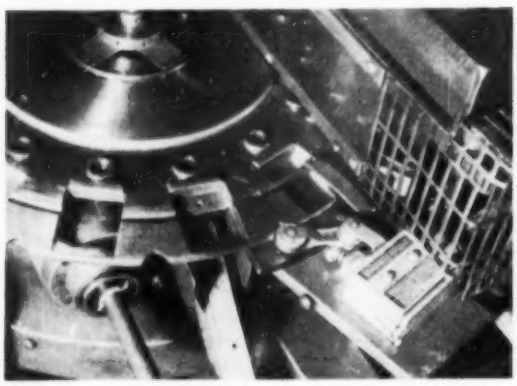
Arrangement of one of the five spotwelding positions along the fixture baseplate. While first operator is using expansion gun at four stations, second operator works at the end station with a scissors-type spotwelder to mount and weld into position a hinged cover and the necessary front-end stiffeners

Blanking and punching forms armature hinge springs from 0.008-in. nickel-silver stock



Bending introduces internal tension, which operates springs in telephone relays

Forming cycle goes like this: Blanks drop from vertical magazine, fall into cutout nests in rotating (clockwise) dial, go through dies the bend and punch two small holes, then drop from dial to slanted chute bar. The magazine feed was suggested by the operator



Air cylinder that rotates dial can only be powered when roller on precision switch drops into notch on edge of dial plate. Switch closes circuit to press clutch (operator presses foot switch, too), which moves ram so arm on punch block can trip air valve for cylinder. Plastic guards (horizontal one removed here) allow safe seeing

PUNCH-PRESS DIAL FEED CUTS NO DUDS

By E. C. NEUHAUS, Design Engineer
and G. W. RADA, Product Engineer
WESTERN ELECTRIC COMPANY

U-SHAPED springs for central-office telephone equipment go through a second-operation press cycle, but they don't run into some of the usual second-operation pitfalls like bad register and slow production. Combined with safety fittings that both protect the operator and let him see what's going on; a positive registering method and an electrically controlled, air-powered dial table insure that the table cannot move until the punches clear the dies, and the ram cannot move until the table is locked in position for a new stroke.

Two sets of dies on a 10-ton, 1½-in.-stroke press work at the same time. The bends are made consecutively in both dies, and the two small holes are punched in the second die as the second part of the bending is completed. Die shoe and dial-indexing unit are both mounted on a 1¾-in. bolster plate. In line radially with 15 hardened-steel bushings around the dial plate are 1⅜ x 1⅞-in. nest holes which carry the springs over the bolster and to the dies. At each ram stroke a bullet-nose locator on the punch holder enters one of the bushings to line up punches and dies.

Register-control is made positive by an electric safety circuit. There are 15 notches in the circumference of the dial plate into which the roller on a precision switch must snap before each press cycle can be started. A foot switch is depressed by the operator, and the press clutch is activated. Because the precision switch is inserted in this circuit, it must be closed—therefore the roller must be in a notch and the dial plate has to be in register—or the clutch will not move the ram. An arm bolted to the ram operates a piston air valve that is mounted vertically on the basep'ate of the die, and air is admitted to the piston under the bolster plate so the cylinder rotates the table 1/15 of a full circle. The arm actuates the valve at the end of the return ram stroke, so the dial table moves only when the punches are clear of the dies. Pressure regulator, filter, and lubricator are between the valve and the main air-supply line.

No repeat strokes have been made with this control in the press tooling.

how to MARK YOUR PRODUCT

BY H. E. LINSLEY, ASSOCIATE EDITOR

AS OLD as personal property, which is almost as old as man, is the desire to distinguish "mine" from "thine." Mason's marks, seal rings and cylinders, and similar identifying symbols abound among the ruins of the earliest civilizations, and their use has continued down through the iron slave collar to the present-day soldier's "dog tag."

The most important feature of any method of marking, apart from clarity, is that it be permanent. Where the product is a casting, the identifying symbols may be cast into it, but on fabricated materials and when the information must vary from piece to piece, they must be stamped on the material itself or on a separate nameplate permanently attached to it.

Methods of stamping vary widely, and although the individual, single-character steel stamp is in common use, specially constructed multiple-character stamps, automatic numbering heads, and fully automatic stamping and numbering machines are available to reduce stamping cost and eliminate human errors.

In this article is a comprehensive review of modern stamping equipment and information on its application and operation.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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Who Made It?

MORE than ever, in a highly competitive world, it is becoming essential that products bear some permanent form of identification. Reasons for this are many: It indicates that the manufacturer feels pride in his product and is not ashamed to be identified with it; it acts as a form of constant, but unobtrusive advertising; it distinguishes one particular item from others of a similar appearance but different make; and it shows the name and address of the builder for ready reference when repairs or replacements are needed. Most important of all, it gives the user certain information, such as a serial number, to distinguish one specific machine from another of the same make, and such pertinent data as horsepower, rpm, amperage, voltage, phases, cycles, direction of rotation, model number, rating, temperature limits, and other information necessary for the proper installation and maintenance of the equipment to which it is applied.

Much of this information could be relayed by instruction books, but these are easily lost or misplaced and are rarely available when needed. Data sheets can be pasted to some part of the machine, but are quickly smeared with oil, obscured with dirt, or torn off in the course of normal operation. Decalcomania are effective, but are readily abraded, covered with paint during reconditioning work, and cannot, of course, be used for giving data which must vary from machine to machine.

The only positive and permanent way of marking material is to impress the characters in the material itself. To a limited extent this may be done during casting or forging, but this is restricted chiefly to trademarks and names, or catalog part numbers. It cannot be done for information which must vary from part to part. Stamping the body of the work, as is done on automobile cylinder blocks or typewriter frames, insures absolute permanency. Even if the characters are filed or ground away by unscrupulous persons, they can be restored by an etching process because there is permanent deformation of the metal structure to a considerable depth.

On large structures, however, it is frequently inconvenient to stamp directly on the material, and on some parts, particularly on sheet metal, the necessary deformation may be objectionable. Moreover, the substantial amount of information frequently required makes direct stamping a long job, increases the opportunities for errors and mis-spellings, and is difficult to keep in alignment.

The best and most practical substitute, therefore, is the separate nameplate. This may be of plastic or fiber, but is most commonly made of metal, usually brass, bronze, aluminum or stainless steel, which is virtually imperishable. The plate is sometimes soldered or brazed to the structure, but the usual practice is to attach it by escutcheon pins or drive screws which are less likely to be removed or fall out than bolts or capscrews.

Nameplates may be cast, etched, stamped, embossed or engraved, and generally carry the manufacturer's name and address, the trade mark, and other fixed information. Such words as model number, serial number, rpm, volts, and other pertinent information are also formed on the plate, adjacent to blank areas of suitable size for stamping the words or figures that apply to the particular unit to which the plate is to be attached.

Nameplate Marking Methods

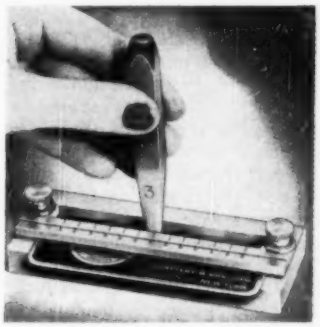
THERE are five principal methods of performing the actual stamping operations on the plates: with hand tools, with power, foot or arbor press tools, with a nameplate stamping machine, with a bench-type, hand-operated roll, and with a hand-fed or fully automatic machine.

Spreading plates on a thick iron anvil plate and then stamping the same character on each plate, followed by the next character on each plate, was the first method of stamping and, apart from power machines, is still the fastest method provided a skilled operator is available. Unfortunately, it requires about 5 yr of training to become fully efficient, and apprentice training for this type of work is not practicable, except perhaps in the largest plants. For this reason, hand stamping is falling into disuse for nameplate stamping, except where quantities are small, but is still widely favored for direct marking on the body of a workpiece.

Hand stamps are rectangular bars of tool steel tapered somewhat toward the working end on which the character is formed, and heat treated for maximum hardness combined with shock resistance. They are made in different sizes from 1/32-in. characters to as large as ½-in. The characters may be hand cut or machine cut, the former being usually considered as more durable. In some cases, as for use on highly stressed aircraft parts, all corners are carefully rounded to avoid introducing stress concentrations in the work. Such stamps, however, are considered as special and are supplied at extra cost. Several special and patented forms of hand stamps are available, featuring knurled surfaces for better gripping and specially shaped shanks for improved safety.

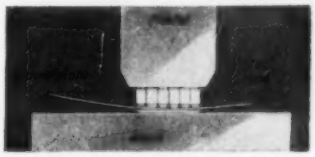
Even such an apparently simple

Single-character stamps are the most widely used marking tools, and may be of simple, straightforward design, or special safety types



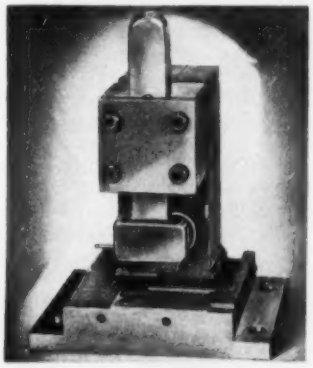
Simple guide and spacing block facilitates nameplate stamping with single-character stamps when production requirements are low

Multiple type holders insure correct spacing and alignment of the characters, and are made in a variety of designs and sizes



Serious distortion may occur if thin nameplates are stamped with multiple type holders. (Illustration is exaggerated for clarity)

Multiple character stamps, made in one piece, are particularly useful for stamping solid material when no change in letters is needed



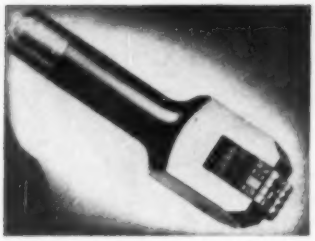
Bench-type holder for multiple-character punch. The block for guiding the shank swings up to permit easy access to the type

operation as stamping a single character requires a certain amount of skill. The stamp must be struck squarely on the head and with the same weight of blow as other characters to insure a regular appearance. If the blow is not square, the imprint will be deep on one side, barely perceptible on the other, and may easily be misinterpreted. With constant use, stamp heads become mushroomed and should be dressed off to prevent injuries to the hands or eyes from slipping tools or flying fragments. When edges become worn and the stamp will no longer make a clear impression, it should be thrown away. It is not feasible to resharpen the outlines, and dull tools not only produce a poor appearance on the work, but require an excessive amount of effort on the part of the operator.

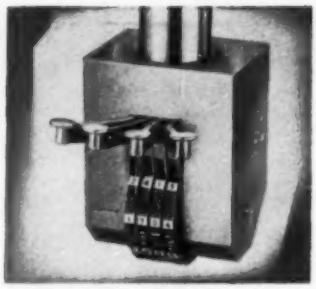
A standard set of stamps will contain all the letters of the alphabet, and may have the most used letters in multiple. Other sets have the numbers from 0 to 8, the 6 being used as 9. Also available are all the conventional symbols, decimal points, dashes, degree, foot and inch marks, and many others. In addition, almost any special design can be made to order on short notice. Such special symbols are frequently used for inspection stamps and may be made on special shanks for insertion into a hammer head. The character itself, and its size, are always stamped on one face of the shank, and it is standard practice to use the face on which the thumb will rest when the stamp is being used. This insures the stamp being positioned right side up. In some cases a knurled "thumb print" is also added to give a better grip.

Hand stamping, however, except in the hands of an experienced operator, is liable to be uneven in both alignment and spacing. When used on nameplates, alignment can be corrected by holding the work in a frame with adjustable guide strips, but spacing still requires some care. Special holders, however, are available for holding any desired number of characters in correct spacing and alignment. These are useful for stamping on solid material, but should not be used on nameplates unless the material is 1/16 in. in thickness or more, as the plate will distort from the multiple characters and the multiplied blow. With individual stamps, the plates may be as thin as 24 B&S gage, although they are usually somewhat heavier.

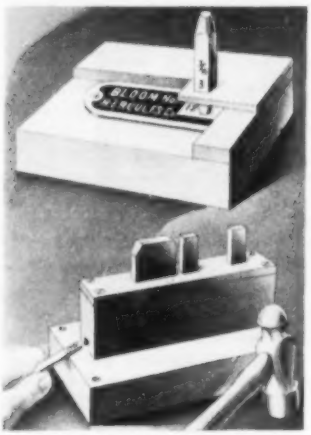
As with individual stamps, there are many styles of holders. They vary chiefly in the manner in which the type blocks are retained and in the ease with which these are removed and replaced. They are almost always confined to holding a single line of type because multiple lines will so distribute the impact as to produce too faint an impression. Holders of this type are also designed to be held in bench-type fixtures which



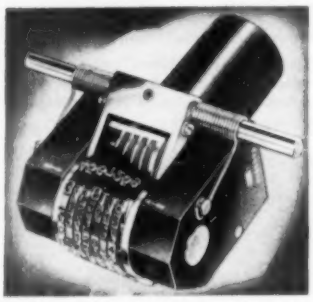
Multi-wheel numbering stamp for hand stamping. Rotating the number wheels is faster than changing individual characters in a holder



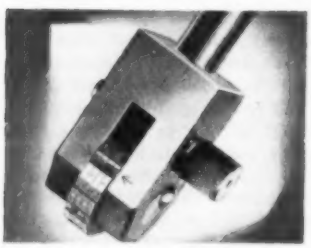
Lever-operated numbering head offers a rapid and positive means of changing individual numbers with maximum safety to the operator



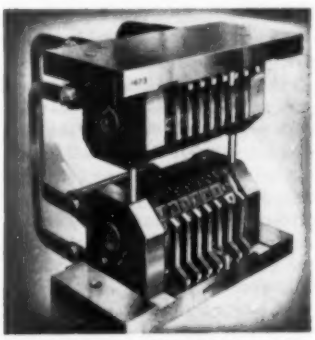
Simple marking fixtures position the work in relation to the stamp and can be made up to handle single- or multiple-character stamps



Full-automatic numbering head incorporates a tripping lever to advance number sequence one unit at each stroke of the machine



Plain numbering head designed for use on punch press or special numbering machine. Figures to be stamped are indicated by arrows



Automatic embossing head carries male and female characters on matching wheels and is used for embossing thin metal plates

incorporate locating nests for the nameplates. The shank is so designed that a spring holds it in the raised position. The impression is made by striking the end of the shank with a hammer.

Specially cut multiple stamps are available with anywhere from two to a dozen or more characters in a single piece. These are useful when the same number or word is to be placed on a number of pieces. They are cheaper than a multiple type holder and faster to use than individual stamps. Multi-wheel numbering stamps can also be had for hand stamping. Changing numbers by turning a wheel is faster than setting type in a holder.

Depending upon the amount of marking required, simple fixtures are readily made up to position the work and the stamp, but if there is any substantial volume of work, regardless of the number of characters, it is advisable to consider some form of marking machine.

Three Classes

Marking, as applied to nameplates, falls into three general classifications: Consecutive numbering, selective numbering or lettering, and constant numbering or lettering. Consecutive numbering refers to the process of serial numbering in which a series of consecutive numbers is applied to a quantity of plates, each bearing a number one higher than the one preceding it. Such operations are generally performed with automatic numbering heads. Selective numbering refers to numbering other than consecutive or constant, and includes all marking made by nominal selection rather than by progression. It is characterized by a fairly frequent change in setup and includes stamping which may vary with each plate or with a given quantity of plates. Daily and monthly date coding is an example of selective numbering. Constant numbering refers to markings which seldom or never change. Yearly date coding is considered as constant.

The type of numbering controls, to a certain extent, the choice of numbering machine, although production also has a definite influence. The regular numbering head consists of a series of wheels carried on a heavy spindle in a yoke-shaped frame equipped with a substantial shank. Each wheel carries the numbers 0 through 9 around its circumference, and units can be obtained with virtually any number of wheels. Alphabetical wheels are also available. In the simplest form the wheels are retained by spring-loaded pawls, and each wheel must be turned by hand for a desired number. In other models the wheels are locked in position, and a latch must be released before the wheels can be turned. For greater convenience,

some models are equipped with keys which can be pressed to change the numbers, and for maximum speed a tripping lever can be had whereby the number sequence is advanced automatically with each machine stroke. Means can also be provided for automatic repeat of a number when multiple plates must be produced.

In addition to these basic types, all kinds of combinations and multiples are to be had, including special forms for stamping in deep recesses, and pivot-mounted types with convex surface wheels for rolling numbers into flat surfaces where rolled pressure is more desirable. A variation is the embossing head for use on thin metal parts. This employs sets of male and female numbered wheels which advance automatically for consecutive numbering and actually emboss the metal. For thin metal tags, tools are available for embossing the number, and piercing and blanking the tag at once eliminates the human element in that the operator is not depended upon to get the right number on the right plate.

When production is somewhat higher, a small power press is used, either bench or floor type, equipped with an automatic numbering head. For six numbers, ⅛-in. high, in steel or stainless steel, a ten-ton press is adequate. If manually fed, the press must be clutch operated at the operator's feeding speed, which will probably be about 30 or 40 plates per min. But with an automatic feed, such a machine can operate much faster.

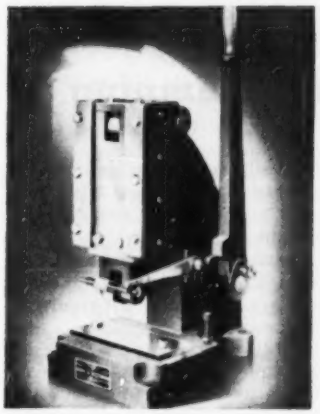
For maximum production, fully automatic machines are available. These incorporate a magazine feed and an automatic ejector and stacker, and may include a paper strip feed whereby the information stamped on each plate is simultaneously recorded on paper strips which are cut off and stacked in corresponding sequence for production control and record. On machines of this nature the setup frequently includes a chase of permanent or semi-permanent type for recording other information. Production on such machines may be 100-150 plates per min.

An example of the use of such equipment is in the production of fractional-horsepower motors. When the nameplate is assembled to the motor, the paper duplicate is attached by the same rivets, to be torn off when the motor is shipped.

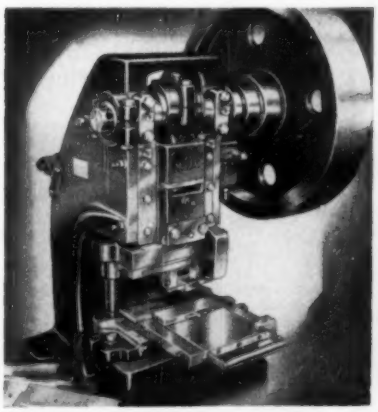
Consecutive Number Stamping

MACHINES for stamping vary from simple manual bench presses to custom-built automatic machines, and even ordinary punch presses are frequently used. Because of the diversity of nameplate shapes and sizes, and of the reading matter to be applied, equipment for high production has generally been custom built.

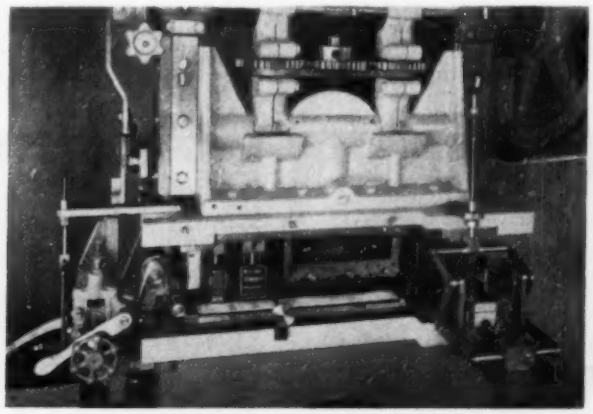
For low-production serial numbering, the bench-type machine is most favored. This may be operated by a hand lever which applies pressure through a toggle action, or by striking a plunger with a hammer. Suitable plate holding and positioning fixtures are made to fit the particular requirements. The machine uses a standard numbering head which insures a neat and attractive appearance and



Manual press for consecutive numbering of nameplates with automatic numbering head. Locating fixtures are attached to machine bed



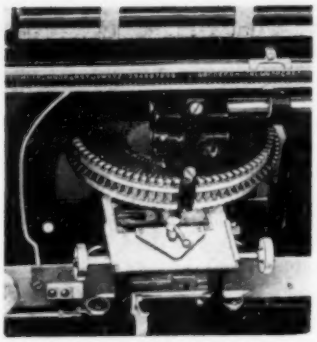
Bench press equipped with automatic numbering head for high production can also incorporate an automatic plate feed unit



Specially built, fully automatic machine for high production stamps nameplate and simultaneously prints a paper duplicate for production control

Lever-operated dial-type numbering and lettering press is particularly suited to stamping data which must vary with each plate

Dial-type press for hammer operation. Adjustable stops position the work, and horizontal indexing may be manual or automatic



Electrically operated machine requires only the selection of the character and pressing a button; can be operated by office girls

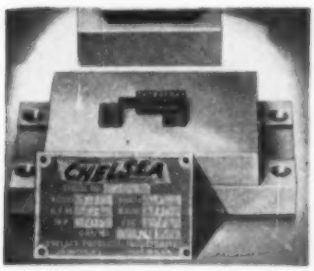
Selective Character Stamping

IN ADDITION to consecutive numbering, nameplates usually carry certain information which may vary from plate to plate or at fairly frequent intervals. If production is low, the most practicable machine is the dial-type numbering and lettering press operated by lever or hammer. These carry a removable dial having the alphabet, numbers, and various conventional symbols engraved on the rim. Suitable dials are available for almost any type of character. In operation, the dial is turned until the desired character appears opposite a pointer, and this is then impressed into the plate. With each character, the plate is advanced one space, either manually or automatically, and at the end of each line the plate is moved forward or back to position the next line under the dial.

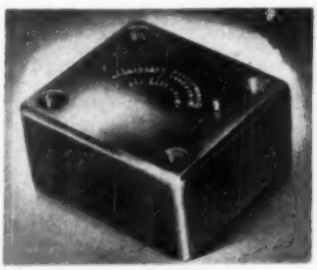
Nameplates produced with this kind of equipment have the advantage of neatness and regularity of spacing, but the process is necessarily slow, as only one letter can be impressed at a time. However, the number of characters to be placed on a plate is not usually large, and the dial press is in wide use.

A variant of the dial type is available as an electrically operated machine in which the characters are held vertically in a horizontally disposed frame or "crown." A blank plate is inserted into a carriage, the character wheel turned so the pointer indicates the desired character, and the operating lever tripped to make the impression. As each letter is made, the carriage advances automatically to the next space. A particular advantage of this type of machine is that it requires no experience or physical strength and may be operated by office personnel. A similar machine is available for embossing.

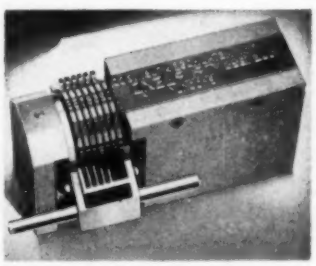
When a substantial amount of information is required, and is of a permanent or semi-permanent nature, production will be improved by use of a chase of type. This may be formed on a solid steel block, or may be built up from individual characters locked into a chase. In this case the letters are not confined to straight lines, but may be arranged to any desired contour. Such units



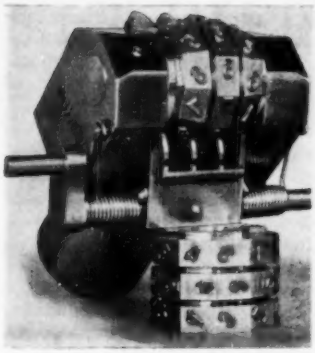
Type chase constructed by locking individual characters into a block is useful for semi-permanent setups requiring occasional changes



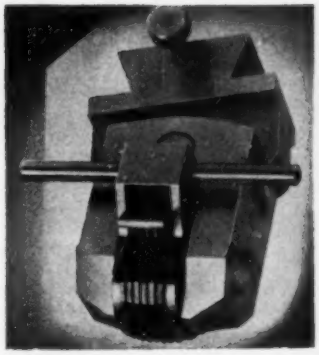
Permanent type chase on which the letters are cut from the solid metal. Characters may be arranged in any desired pattern



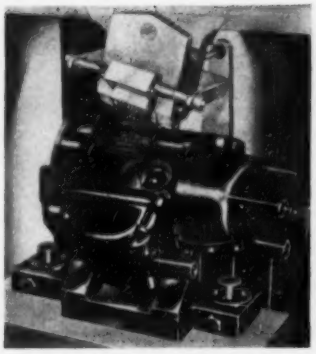
Combination setup of automatic numbering head with chase of permanent characters having removable inserts for stamping date



Specially designed numbering wheels with characters engraved on a radius for stamping the convex end of bevel pinions



Pivot-mounted, automatic numbering head has wheels arranged in barrel form for rolling over the work in a special machine



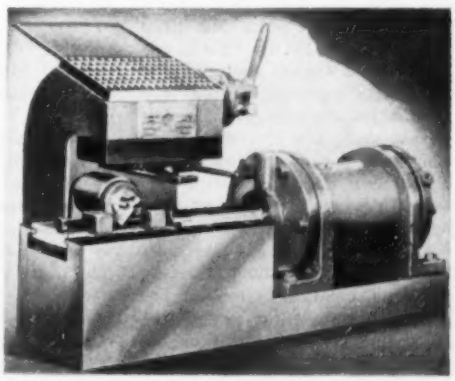
Rocker-type numbering head is useful on plastics, as the impression is made progressively with minimum pressure on the work

may be used in the same manual or power-operated presses as are used for numbering heads, and are frequently combined with numbering heads for producing a complete nameplate in a single operation. Also available are special power-operated or manual machines designed for use with movable type for marking all the panels in a nameplate simultaneously.

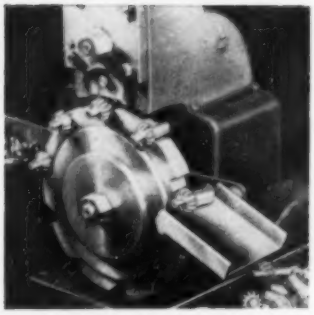
A somewhat different type of marking is that in which the characters are formed on the periphery of a roll. The plate is inserted between the roll and a pressure roller and the roll rotated by a lever. This advances the plate automatically as the characters are impressed. Equipment of this type is adaptable to marking either flat or curved plates, depending on the form of supporting table used, and has the advantage of producing characters of equal depth throughout. With a flat chase of type, especially when the rows are rather long and the stamping is done by hand, it is often difficult to impress all characters to the same depth, and those at the ends are likely to be quite faint. With roller type, however, only one character in each line is in contact with the work at any given time, so the full working pressure is applied from end to end of the line. A similar effect can be obtained from flat type by using a pressure roll to traverse across the back of the plate, but unless the machine is specially designed the plate may bend or distort.

Although nameplate stamping is a simple operation, there are several precautions to be observed if the quality of the finished plate is to reflect the over-all quality of the product to which it is to be attached. Don't stamp thin metal plates too deeply, or they will be distorted, and don't purchase plates of less than 18 B&S gage if they are to be stamped — 16 gage is preferable. But for plates which are not to be stamped, 26 B&S gage is usually adequate. Plates with square sheared corners are dangerous to both the worker and the customer. Purchase them with rounded corners. Don't expect to produce top-quality work with hardware-store stamps. The characters are not accurately centered on the shanks unless specially ordered at a custom-built price. Don't try to stamp nameplates on a wooden block—use a steel plate or anvil. Don't try to re-stamp a plate that has been marked incorrectly — it's cheaper and better to use a new plate.

←
Roll-type die has characters engraved on the circumference. Work is marked by passing it between the die and a pressure roll



→
Air-operated roll-type marking machine uses interchangeable type in a flat chase, and is designed to prevent nameplates from curling



Dial-feed machine for continuous operation is self-unloading, and may be equipped with chute feed if shape of workpiece permits

Marking roll for use in lathe has interchangeable characters; is useful when production does not justify special machine

Workpiece Stamping

ALTHOUGH the nameplate is deservedly popular as a means of combining the brand name with essential information, there are many occasions when a separate plate is not practicable. Sometimes only a single character such as a trademark or inspector's stamp is required, and will be placed on a surface which will be hidden at assembly, and at other times the information to be stamped varies from piece to piece. In such cases the familiar steel stamp is most commonly used. In many cases, however, the markings must present a neat appearance and must frequently be positioned accurately in relation to certain points.

Here again the automatic numbering head and the multiple typeholder are widely used, with or without a chase of permanent type. Special numbering heads are available with the numbering wheels of star form to reach into deep recesses, or with the figures engraved on a convex radius or flat radius for such specialized jobs as numbering pinion gears. Models are also made with extremely small characters for use on watch and instrument parts, or with the wheels arranged in a barrel form for rolling over the work.

Frequently the same machines can be used for product stamping as for nameplate stamping, but special fixtures must usually be built to hold and position the work.

For continuous production, a wide range of standard machines is available, the choice depending upon the general size and class of work to be handled.

For plastic or relatively fragile materials which will not stand the sudden impact required to stamp a complete number at one stroke, a sliding type of machine is recommended. On this, the numbering head is arranged on a rocker and the wheels are disposed in a barrel form. The work is held on a table and the head traversed across it so only enough pressure is required to mark part of a character progressively until the entire number is completed. The same machine can be used for marking round parts by mounting them on a fixture on which they are free to rotate, and using a straight numbering head rigidly attached to the slide.

Production Marking

When high production is required, magazines, chutes and dial feeds can be applied to standard machines to enable them to operate continuously. But when large quantities of a single type of product are required, the most favorable results are usually produced by special machines built for the job. These vary widely, according to the particular job, but are usually built around one or two basic elements. One of the most popular types consists essentially of a rotary table which positions the parts, carries them past a fixed die and discharges them automatically. Pneumatic or spring pressure insures uniform depth of impression regardless of variations in diameter within normal commercial limits. For thin shells, mandrels can be mounted on the table to absorb the marking pressure and prevent distortion.

Similar equipment can be applied to production knurling of parts of almost any size, and will frequently do a much faster job than could be performed on a lathe.

A somewhat different type employs a vertical dial with notches on its periphery to pick up the work from a gravity-feed chute, roll it under the die where pneumatic pressure is applied, and allow it to fall into a discharge chute. If the shape of the part does not permit a chute feed, the dial may also be hand fed.

Precision graduating can also be performed on either flat or round work by using special dies geared to the work holder to insure accurate and uniform marking.

Many small objects are frequently produced on standard punch presses with simple or progressive dies into which automatic numbering heads and chases of type are incorporated. When conditions justify, roller-type marking tools may be mounted in a lathe tool post, or in the toolholder of a turret lathe or automatic, although an automatic marking machine will usually be more satisfactory if large quantities of parts are involved.

We Acknowledge . . .

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Numberall Stamp & Tool Co.
Roberts Numbering Machine Co.
Geo. T. Schmidt, Inc.
S. M. Spencer Mfg. Co.

IF YOU TAKE CARE...

Carbides Produce More on Automatics

BUT to get extra production you must pay a price: willingness to embark on a training program. Here speaks a man who outlines his experience with tool design setup and servicing problems

BY. C. R. MORGAN, Screw Machine Section
GENERAL ELECTRIC COMPANY, PITTSFIELD, MASS.

OUTSTANDING results obtainable with cemented-carbide tools are changing the practices and techniques of automatic screw machine work. Tipped drills, chasers and forming tools of improved design are now available. And tipped cutoff tools can be used where spindle speeds are sufficient, or where cutoff breaks through into a drilled hole.

These accomplishments make necessary an educational program for supervision, tool designers, setup men, and others concerned with screw-machine efficiency. New thinking must be introduced. Effectiveness of the program is extremely important if the full advantages of cemented-carbide tooling are to be realized.

In organizing a program, the first and most difficult problem is to abandon practices or techniques that do not apply to cemented carbides. Stress the following:

More Parts per Grind—Properly handled, cemented-carbide tools perform more work than tools previously used. Chasers can be operated at faster spindle speeds, producing thousands more parts per grind. And this is accomplished without tool maintenance or adjustment of dieheads. Heretofore, high-speed chasers could seldom produce over 150 parts between grinds on some jobs, because of the heat generated. Longer contact of tools with the work caused heat distortion of parts, required tolerances could not be held.

Proper Tool Design—The effect of toolholders on output and cost and the proper design of tools and toolholders must be emphasized.

Planning the Work — Effective planning of tooling and layout of work should be discussed. Work sheets with complete information must be given the operator. No detail is too insignificant to consider. An example is the ordinary and commonly used recess toolholder. In the past, little thought was given to the amount of material being removed, the depth of cut or the amount of stock removed per revolution. If they had been considered, such matters could not have been controlled.

In Fig. 1, recess toolholders are shown that control, through the use of cam and followers, the throw of the tool to any desired depth of cut or removal of any amount of stock per revolution of spindle. When the operation is finished the tool is automatically reset to repeat.

Faster Operation — Proper tooling results in greater stock removal, permitting a more efficient utilization of equipment. Often two or three parts can be produced in the time formerly required for one. This is only one of several factors which must be taken into consideration by methods men when planning work to use cemented-carbide

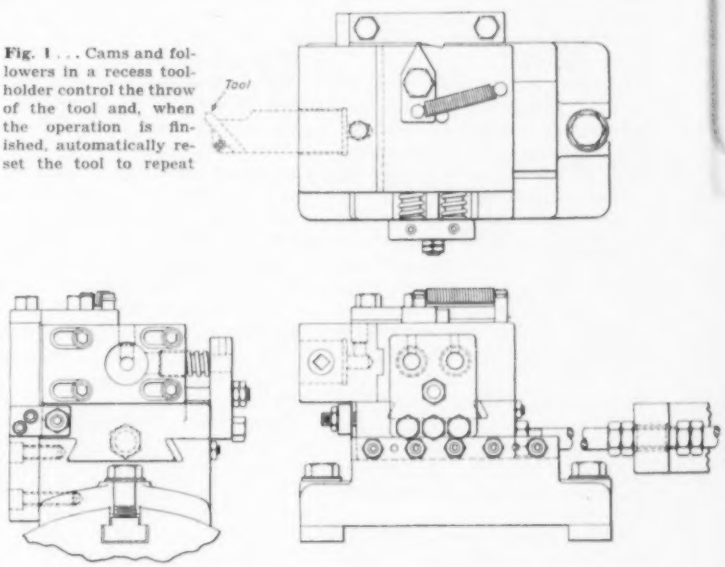


Fig. 1 . . . Cams and followers in a recess toolholder control the throw of the tool and, when the operation is finished, automatically reset the tool to repeat

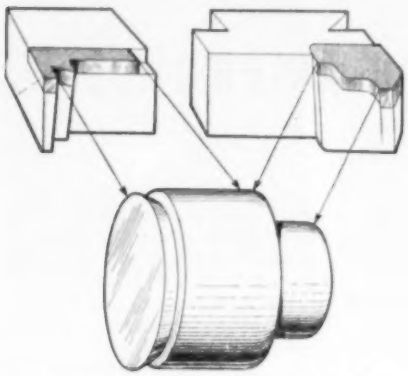


Fig. 2 . . . Two form tools are used on the workpiece shown, in order to simplify grinding the carbide. A 3° clearance is used on shoulders and steps

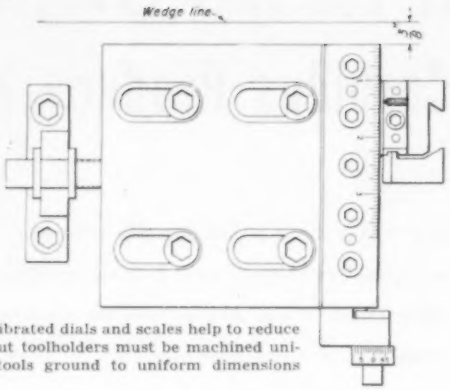
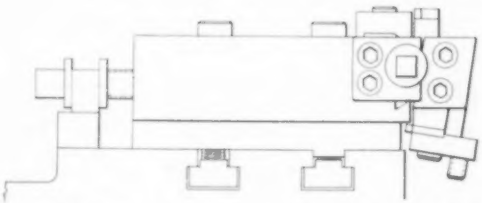


Fig. 3 . . . Calibrated dials and scales help to reduce setup time, but toolholders must be machined uniformly and tools ground to uniform dimensions



tooling and equipment properly.

Form Tools—In designing form tools when opposite clearances are required, all shoulders, steps and clearances must be planned. In forming parts requiring cuts on both sides of shoulders, forming should be done with two tools, as shown in Fig. 2. Where one high-speed-steel tool ordinarily was made to complete the part, it is necessary to use two cemented-carbide tools so that proper angles and clearances can be ground on opposite shoulders. This practice reduces wear, eliminates excessive grinding and maintains a free cutting condition.

Grinding — Toolroom operators need a thorough and complete understanding of changed conditions. The importance of including these men in the educational program cannot be overlooked.

Need for Continuous Effort—The educational program must be carried on continuously because new developments are coming along each day. Many of the new machine tools incorporate some of the necessary improvements. In addition, equipment already in use often can be adapted to cemented carbides.

Servicing — As cycle time is materially reduced, it is important to reduce servicing of equipment proportionally.

Motor Power—Since material is being removed faster than formerly, power requirements are increased. Sometimes it is necessary to increase motor power 100% to accomplish the desired results. However, a 20% increase over previous ratings is normally required. Unless sufficient power is available at peak load to maintain constant spindle speed, cemented carbide tools will break down or become dull, resulting in poor tool life and excessive breakage.

Chip Removal — Removal of chips becomes a major problem. A continuous flow of chips should be disposed of automatically. This should and can be done without requiring the operator to spend more time on chip removal than was formerly the case.

Stock Loading—Stock must be replaced in proportionally shorter periods. In many cases this cannot be attained by the processes used in the past. Automatic magazine stock loading equipment is one answer.

Lubrication Equipment — Machines operate at higher speeds. As greater speed is used, more careful and constant attention must be given to lubrication. Oiling and greasing outlets may be added to machines. This is not always entirely satisfactory. In order to keep servicing time at a minimum, automatic lubrication is frequently desirable.

Setup and Resetting Tools—Although from eight to twelve tools are usually required to complete a finished part, very little attention is ordinarily given to accurate setting of tools in automatics.

Each tool must be set in proper relation with every other tool used. Some provision is needed for fast and accurate setting of tools, either when making original setups or adjusting and resetting after grinding. This is being done to some extent by calibrating toolslides, holders and ways. Dial adjustments or adjusting screws, plus accuracy in making toolholders, would probably reduce this part of servicing time by as much as 70%.

An attempt has already been made to reduce setup time, Fig. 3. Calibration of the dial on crossslides has given some relief. However, accurate and complete calibration of all positions must be followed with uniformly machined toolholders. Accuracy in grinding of tools to uniform dimensions with simple gages for resetting of tools

is also important. These can be made adjustable and set, and will enable an operator to maintain his setting of tools in a minimum space of time.

It is entirely possible, if slides, carriers, holders, and tools are properly calibrated and ground, that a complete setup can be made to almost perfect requirements before a spindle is revolved or a machine started. This would allow 95% of a setup to be made without interference of coolants, give minimum scrap.

Ammeters—As greater efficiency and performance is attained, more accurate check on tool breakdown is required. If tools are permitted to become excessively dull, serious tool or machine breakdowns may result. Power consumption reflects the condition of the tool. It is advisable to install ammeters to record current consumption. Through proper calibration, the operator is advised before the breakdown point is reached, so that tools will be removed and serviced. This will result in longer tool life, reduced grinding time and the tools can be serviced before the wear has been so great that tools and parts are spoiled.

Toolholders—Holders must be made for holding tools more rigidly and accurately. With an increase in stock removal, added pressure and strain put an extra heavy load on toolholders.

Holders should be so designed that the tool can be clamped with solid support to eliminate chatter or vibration. They also should be made to work closer to chuck or machine head. Corners and pockets must be eliminated for a freer flow of chips from tools and work. Old-type rocker supports are not adequate for proper clamping and holding, and should be replaced with solid but adjustable surfaces for tools.

Coolants—A good water-soluble coolant has proved superior to oil for cemented-carbide tools operating at high speeds. The water coolant has sufficient lubricating qualities for all purposes, does not rust or corrode parts, ways, slides, bearings or spindles, has better cooling properties and gives a greater tool life. It prevents distortion of parts from excessive heat, when working to close dimensions, because parts are cool when they drop off.

This is particularly true when copper or Everdur are machined, involving removal of considerable material. Examples are: deep-hole drilling where close dimensions and finishes are required, and heavy forming operations.

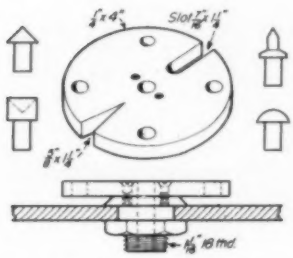
Some brands of water-soluble oil have been recommended for use as a lubricant. If they are used, filtration is required to remove dirt from the compound.

Cleaning of Machines—Machine bases should be made more accessible for cleaning chips and coolants. Reinforcements like projections and baffles extending into the base make chip removal difficult and provide pockets to catch fine turnings. The base should be free of all obstructions to facilitate more frequent and easier cleaning.

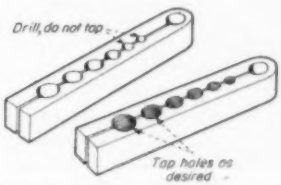
Other factors may enter into efficient performance of cemented-carbide tooling on automatics. But, the conditions mentioned are of the most importance. By revising practices along the suggested lines, full advantage of cemented - carbide tooling can be realized.

Short Cuts FOR THE SMALL SHOP

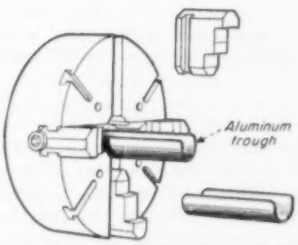
BY CHARLES L. LEEPER



AN EXTENSION for the drill-press table is easily made from a discarded automobile flywheel. This table is fastened to the head of a special screw having a through hole. Various attachments (four shown) should be made a close fit for the center hole. They are stored in the holes around the periphery of the flange. A U-slot and a V-slot cut into the table enable drilling through the openings but not into the machine table.



SUB-VISES for threaded and plain work hold parts securely in the bench vise while a variety of operations are performed. One can have a series of holes tapped and then be slotted lengthwise to act as a spring vise while cutting off or slotting screw heads. The other device is likewise slotted lengthwise to act as a spring vise for various sizes of plain rounds.



A CHIP CATCHER is a great convenience when cleaning 3-jaw and 4-jaw chucks. Take a piece of aluminum sheet about 3 or 4 in. long and form up to a U-shape trough to fit into the central hole in the chuck body. With one jaw at top position, insert the chip catcher, remove and clean the jaw, screw and slot, then replace parts. Now, go to the next jaw, and so on, until the entire chuck is clean.

TAILOR-MADE CONTROL SYSTEM BOOSTS QUALITY PERFORMANCE

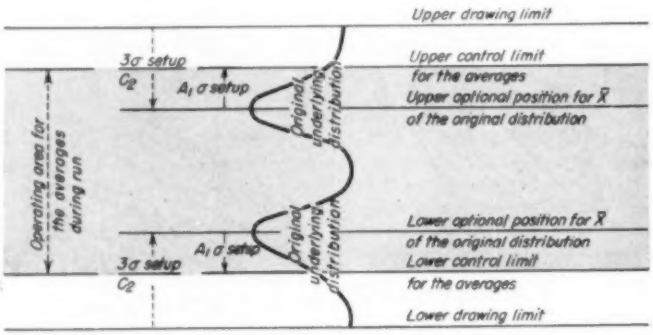
BY J. J. MONTRESOR, CONSULTING ENGINEER • MONROE CALCULATING MACHINE COMPANY, ORANGE, N. J.

With this system you can cut rejects even on small-lot orders. It is designed to fit conditions as they exist, requires few changes in normal shop routine and operates without extensive statistical records

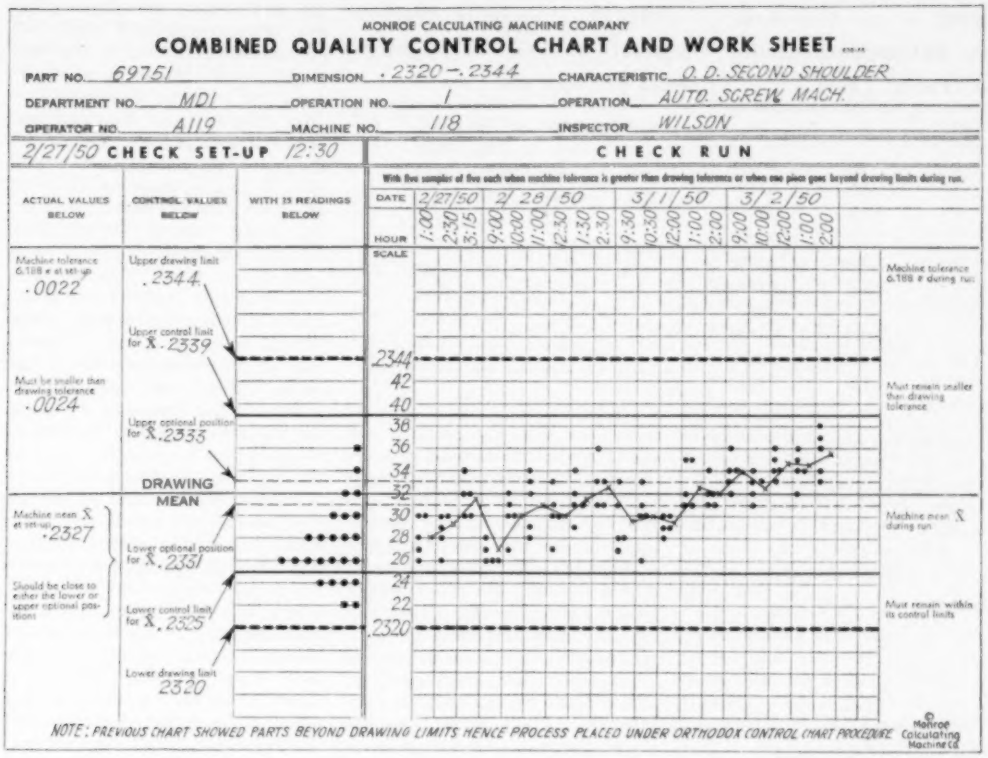
THE PERCENTAGE of defective work at Monroe is at an all-time low. Reason: an unusual system of quality control that indicates the acceptability of a setup at the time the setup is made, that points out to supervision those operations that deserve close attention, and that aids management in improving the quality performance of individual operators.

The system is designed to overcome problems commonly encountered in the initial stages of a program, and includes features that it is felt are of such a practical nature as to mean the difference between success and failure in the introduction of quality-control techniques. Among these are: (1) Computation work is cut to a minimum; first, by eliminating all calculations during the run, except in those rare instances when a piece falls beyond the drawing limits, and secondly, by employing a calculator on necessary statistical work. (2) The system imposes no set routine of sampling on the operator. Sampling groups of five are preferred but not required. (3) Timing of sampling periods is also left to the discretion of the operator. One-half hour intervals are preferred but again are not required. (4) Go and no-go gages set to the drawing limits are used in checking samples at the machines. There is no need for changing the sensitive and expensive measuring instruments which are necessary in orthodox chart work based upon control of variables. Gages usually available at the machines are utilized. Thus, in several ways, the system blends itself with shop conditions as they exist—an important point, as these practical considerations often determine the success of an entire quality control program.

At Monroe the main obstacles in the ready application of control chart work at the machine were the existence of short runs, scarcity of information on past performances, and a habit of the operators to tinker around with the original setup during the run. These conditions prevented the building up of a good statistical background for determination by the classical method of the central line position of the dispersion of the underlying distribution, and of the related control limits. It was decided, therefore, that a procedure which immediately would indicate approval of the setup, and which at once would yield a set of control limits for the run would be extremely useful. Such a plan would meet the demands not only of those jobs on which lots were small or on which new setups are frequent,


Upper drawing limit
3σ setup / C2
A1 σ setup
Upper control limit for the averages
Upper optional position for X̄ of the original distribution
Original underlying distribution
Operating area for the averages during run
Lower optional position for X̄ of the original distribution
Lower control limit for the averages
Lower drawing limit

Operating principle of control procedure is this: Tools are set so center line of heavy black curve, which represents underlying distribution of process, falls $\frac{3\sigma \text{ setup}}{C_2}$ from either drawing limit. These lines are called upper and lower optional tool-setting positions and are shown in diagram. Then it can be expected that almost 100% of parts produced will fall within drawing limits. If during production run, a part falls outside drawing limits, samples then are taken in orthodox manner and job is stopped if control limits are exceeded. These limits are determined by adding or subtracting $A_1\sigma$ setup from optional tool-setting positions


MONROE CALCULATING MACHINE COMPANY
COMBINED QUALITY CONTROL CHART AND WORK SHEET
PART NO. 69751
DIMENSION .2320 — .2344
CHARACTERISTIC O.D. SECOND SHOULDER
DEPARTMENT NO. MDI
OPERATION NO. 1
OPERATION AUTO. SCREW MACH.
OPERATOR NO. A119
MACHINE NO. 118
INSPECTOR WILSON
2/27/50 CHECK SET-UP 12:30
CHECK RUN
With five samples of five each when machine tolerance is greater than drawing tolerance or when one piece goes beyond drawing limits during run.
ACTUAL VALUES BELOW
CONTROL VALUES BELOW
WITH 25 READINGS BELOW
DATE
HOUR
SCALE
Machine tolerance 6.188 # at set-up .0022
Must be smaller than drawing tolerance .0024
Upper drawing limit .2344
Upper control limit for X̄ .2339
Upper optional position for X̄ .2333
DRAWING MEAN
Machine mean X̄ at set-up .2327
Lower optional position for X̄ .2331
Should be close to either the lower or upper optional positions
Lower control limit for X̄ .2325
Lower drawing limit .2320
Machine tolerance 6.188 # during run
Must remain smaller than drawing tolerance
Machine mean X̄ during run
Must remain within its control limits
NOTE: PREVIOUS CHART SHOWED PARTS BEYOND DRAWING LIMITS HENCE PROCESS PLACED UNDER ORTHODOX CONTROL CHART PROCEDURE
Monroe Calculating Machine Co.

Control chart is run by inspection department personnel and is kept in Quality Control Center where all figuring and charting is done. Section at left of double line is filled in at time of setup. Readings from first 25 pieces of production run indicate acceptability of setup and provide values for control limits during run. Section at right is needed only if part goes beyond drawing limits during run. Then, samples are taken in classical manner and are checked against established control limits to bring the operation under control

but also on those jobs on which the runs were longer and on which the orthodox control chart techniques were feasible. Moreover, in searching for such a plan, we were fortunate in having at our disposal our fully automatic calculators which could reduce normally cumbersome and time-consuming calculations to a fast and simple operation.

The procedure finally evolved departs from the conventional practice of employing a chart for the means as a measure of central line tendency and a chart for the ranges as a measure of dispersion, and is based on the standard deviation. Three good reasons can be given for this selection: (1) In comparison with other measures of dispersion the standard deviation has the highest efficiency for any size sample greater than five. (2) As will be explained, this procedure checks an ungrouped sample of 25 at the time of setup. The range, which is generally used because of its ease of computation can be accepted when dealing with the standard sample size of five, as the loss of efficiency at that point is only about 2%. For samples of more than ten observations, however, the range rapidly becomes less efficient than the standard deviation and cannot be used in its place as a measure of dispersion. (3) The objection that the standard deviation is harder to understand and takes longer to compute is overcome by the use of a calculating machine in its derivation as the mathematics involved then becomes a quick and simple routine.

Checks the Initial Setup

The first 25 pieces from a new setup are set aside and measured. Readings are recorded in 0.0001 in. as, with the usual drawing tolerances, the results then can be grouped into the necessary ten or more statistical cells. These 25 readings are treated as one group, thereby eliminating the additional effort of trying to array them in the orthodox manner of five chronological groups of five readings each. While this method does not give us a desirable view of the relationship and trend between the five chronological groups themselves, it yields a sufficiently satisfactory picture of the acceptability

TABLE 1 ... Constants for Determining Limits on Control Chart

SAMPLE SIZE	A_1	C_2
2	3.759	0.5642
3	2.394	0.7236
4	1.880	0.7979
5	1.596	0.8407
6	1.410	0.8686
7	1.277	0.8882
8	1.175	0.9027
9	1.094	0.9136
10	1.028	0.9227
25	0.619	0.9697

TABLE 2 ... Weekly Average Number of Lots of Rejected Work per Operator

2.46	2.80	2.13	2.73	1.73
1.33	3.73	3.46	4.00	0.13
3.20	1.53	0.67	2.00	0.67
3.06	*5.99	2.86	2.86	0.33
*6.46	1.67	1.67	3.06	0.20
0.93	2.00	2.66	4.33	0.07
*5.59	1.47	0.87	4.40	0.33
1.07	1.53	*8.19	2.66	0.07
4.60	3.13	4.06	0.27	0.33
1.47	1.93	0.67	0.33	0.13

*Operators whose rejected lots exceeded departmental average by more than a 3 sigma amount.

of the setup in regard to the underlying distribution as to make it valuable and acceptable.

From these 25 readings the standard deviation is computed. The acceptability of the setup is then determined by comparing the machine tolerance of $\frac{6\ \sigma\ \text{setup}}{C_2}$ with the total tolerance allowed by the drawing. The value of C_2 corresponding to a sample size of 25 will be found in Table 1 and is 0.9697. The machine tolerance then becomes 6.188 σ setup and, if it is found that the machine tolerance is smaller than the drawing tolerance, we then are assured that operating conditions can give us acceptable parts.

Shows Where to Set Tools

We now are ready to make further use of the standard deviation in determining the most desirable starting position of the machine mean, $\bar{X}$. One of these, the lower optional tool-setting position, is figured by adding $\frac{3\ \sigma\ \text{setup}}{C_2}$, or 3.094 σ setup, to the lower drawing limit; and other, the upper optional tool-setting position, is determined by subtracting 3.094 σ setup from the upper drawing limit. At the beginning of a production run the actual machine mean, $\bar{X}$ setup, is figured as outlined above and the setup so rearranged as to place this value as close to either one of these optional positions as possible. The choice depends upon operating factors, such as tool wear, whose influence on quality trends during the run can be predicted and is made in the direction that will yield the longest run. The standard deviation is also used in determining the control limits for the machine means that will appear on the control chart during the run. The upper control limit is figured by adding the value of A_1 σ setup, or 1.596 σ setup, to the upper optional tool-setting position. The lower control limit is determined by subtracting the value of 1.596 σ setup from the lower optional tool-setting position. The values of A_1 are those listed in Table 1 for a sample size of five.

Controls the Run

If the process dispersion, or machine tolerance, figures out less than the drawing requirements, and if the machine mean has been correctly placed with respect to the optional tool-setting positions, it can be assumed that the process can deliver what the drawing requires and that it is under control and ready for the production run. For the sake of expediency and low inspection cost, a loose sampling by attributes control, having the operator check samples of approximately five every so often and allowing no defectives beyond drawing limits, then is used during the production run. If a defective does appear, the process then is brought under the more rigid inspection of orthodox control chart procedure; inspection immediately checks 25 specimens arranged in five chronological samples of five each and compares the five computed means with the established control limits. The new machine tolerance, 6.188 σ, also is compared with the drawing tolerance. If it is found that any one of the means exceeds the control limits or if the new machine tolerance is greater than the drawing tolerance then the process may be considered out of control and should be stopped.

If, on the other hand, the machine tolerance at the time of setup is greater than the drawing tolerance, it may not be a true indication of the undesirability of the setup. If the 25 readings had been treated as five groups of five each a trend towards acceptable values might have been noted and a change in setup avoided. When the 25 readings are taken as one group, two courses of action are open when the machine tolerance figures out to be greater than the drawing requirements. The conservative, and perhaps too-costly course, is to assume that the setup is unacceptable and to require that a new setup be made. The other course of action is to take a second batch of 25 readings grouped in five successive samples of five each, compute their means and compare these means against the control limits previously established by the original 25 readings. A new setup is required if any of these values goes beyond these control limits or if the machine tolerance, 6.188 σ, again proves itself greater than the drawing tolerance.

Inspector Does the Figuring

The mechanics of this system during the run are also simple: samples that the operator has set aside during the run and checked himself in accordance with the requirements of his job description are picked up periodically by an inspector and brought to a Quality Control Center where they are placed in a receptacle attached to the related control chart. If all the pieces brought in at the time have passed go and no-go gages at the machines, then a simple O.K. and time entry on the chart will suffice to indicate that the run is progressing satisfactorily. Whenever one piece does not pass the go and

no-go check, the operator calls the inspector who collects the next 25 pieces in five groups of five each. He takes them to the Quality Control Center where they are measured and their means and standard deviations are computed. If any of these values fall beyond their respective control limits the process is stopped and a resetting is made. These 25 readings also are recorded on the chart in five successive columns.

As stated before, the procedure is woven around actual shop conditions as they usually exist. While the procedure might be accused of being a little loose, guaranteeing no better than 14% AOQL under the worse process conditions of percent defective being borderline, it still gives us a good measure of control in those cases where more statically sound techniques are not used at all because of cost considerations. Moreover, it is a rare case where the process is delivering borderline percent defective quality. In most cases, the machines deliver either much worse or much better than borderline quality and in such cases they are checked and controlled quite effectively by this low-cost and statistically easy procedure.

Helps on Troublesome Jobs

In addition to the aspects of practicability and simplicity in operation there are other important problems in the introduction of a Quality Control Program that seriously affect its cost and hence its ultimate success. These are the problems of the selection of the initial points of application, of the determination of the extent of their expansion, and of the collection of sufficient data to prove, in dollars and cents, or in operator quality performance indices, the benefits that can be derived and made possible by its application at these points. Obviously, for instance, there would be no logic in applying the plan to those operations and characteristics that never have given trouble.

An approach to the solution of this problem is given by our treatment of the matter at Monroe in the automatic screw machine department. On any job, the check at the time of setup is made only on that characteristic that is considered the controlling one of all the dimensions being created. If there is no such outstanding characteristic, then the dimension selected is the one that has given the most trouble in the past; or, if such records are not available the one that has the closest tolerances. Because of cost considerations, no other characteristic on the part is brought into the statistical control procedure at the time of setup. The operator, however, is expected to check all dimensions produced during the run and whenever a dimension not previously considered important goes beyond the drawing limits it too is brought under the controls of the procedure.

A big help in the initial selection of characteristics to be checked was the record of the operations that had produced rejected lots in the past and that had therefore required costly 100% screening inspections later on. Obviously, the clue here was to select the characteristic that had caused the rejection and place it under the controls. The efficacy of the plan in reducing over-all costs and hence the general value and benefits of the Quality Control Program were easily measured by comparing the number of rejected lots per month requiring 100% inspection before and after the plan was introduced.

Aids Operators

Another record of great value in helping us select operations and characteristics to be checked was the weekly report of the operator quality-performance in terms of number of rejected lots for which he was held responsible. For a fifteen-week period, Table 2 shows the average weekly quality performance of fifty different operators in the automatic screw machine department.

The 6 sigma limits for this population was ± 2.4 rejected lots per week, about the department average of 2.27 lots per week. This gave a maximum of 4.67 rejected lots per week per individual and we found that four operators were beyond this limit. These, therefore, were the operators that required help and all their jobs were placed under the established controls. A marked improvement was noted in their performance in the succeeding week, although two of them still fell outside the new and tighter control limits figured for the new population. As time went on and the weekly checks continued, it was found that three of these operators could be brought in line with the average departmental performance but the fourth had to be considered a misfit in the screw-machine department and had to be transferred to other work.

Thus, quality control through the standard deviation has aided our operations in several ways. And it has done so at very little expense and with practically no changes in our normal operating procedures—considerations that are particularly important in the initial stages of a new program, both from the point of view of management and the operators of the machines.

HOW TO COMPUTE THE STANDARD DEVIATION

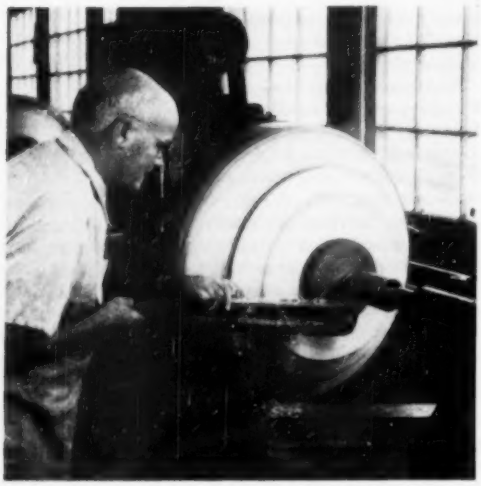
The first 25 pieces from a new setup are measured and readings recorded as dots in the proper cells on the Monroe Combined Control Chart and Work Sheet. The following steps then give the standard deviation:

1 . . Add the 25 original readings.
2 . . Divide this sum by 25. This gives the machine mean or $\overline{X}$ for the setup.
3 . . Find the difference between each reading and this average.
4 . . Square each of these differences.
5 . . Total these squares.
6 . . Divide this sum by 25.
7 . . Take the square root. This gives the standard deviation or σ for the setup.

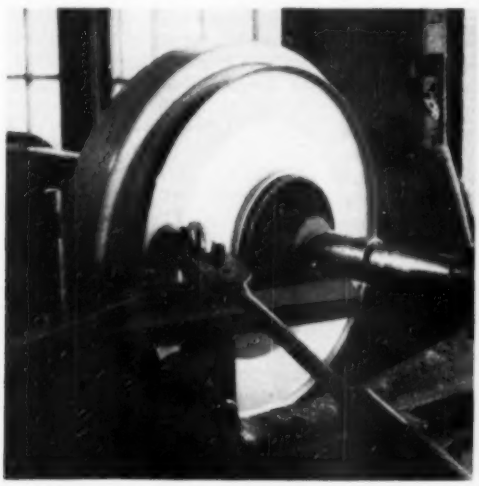
Although laborious by long-hand methods, these calculations can be reduced to a quick and simple routine on an automatic calculator.

SPINNING LOOKS SIMPLE —TAKES KNOW-HOW

1 **Spinning tools** take a variety of shapes according to the particular task they are to perform. The lever tool, center, has a compound action for heavy work. Tools are mounted in stout ash handles and are frequently designed by the individual operator



2 **Wooden chucks,** made from laminated hard maple, are widely used for spinning parts whose production does not warrant the expense of steel chucks. They are often made by the spinning operator using a chisel on the actual spinning lathe



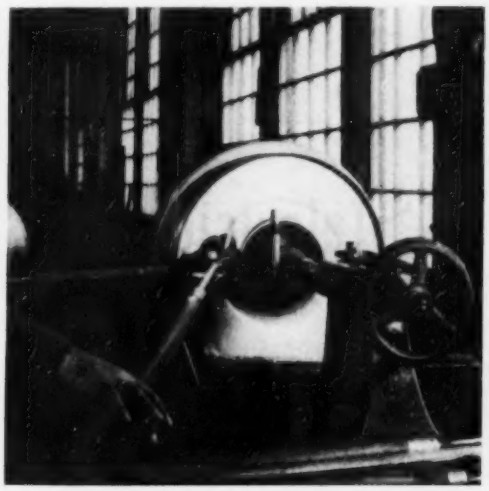
5 **Close-up view** of lever tool in operation, showing the hardened steel roller and the variable pivot points. Lip on outer edge of work is rolled over by a wooden tool as a preliminary operation to stiffen the blank and prevent vibration and whip

6 **Long experience** is the only guide for telling the operator exactly how and where to apply the tool, and what tool to apply for laying down the metal to the exact contour of the chuck . . For this work, know-how is more important than mere strength

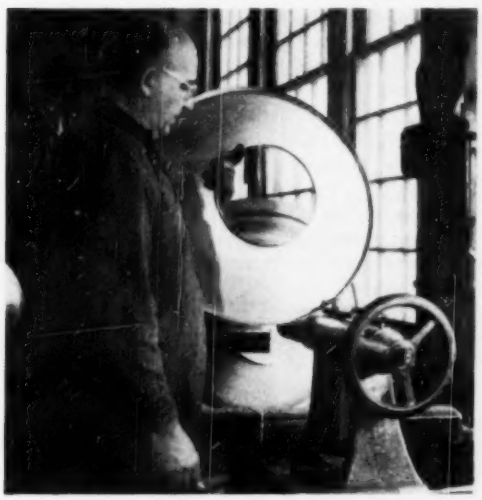
Familiar sights in air-conditioned shops and offices, Anemostats deliver cooled air which is mixed with room air within the device because of pressure differences produced by concentric conical rings . . .

Here are eight pictures taken in the plant of Anemostat Corp. of America, showing how the aluminum—or stainless steel—cones are spun from flat blanks

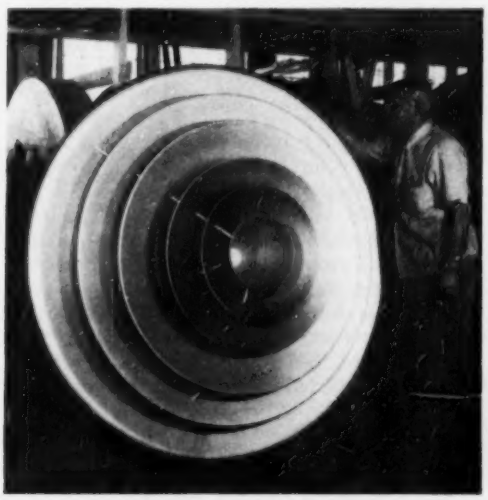
3 **First step** in spinning is to grip a disk of metal between the wooden chuck and a large, flat, ball-bearing center. Tailstock must be drawn up tight so metal will not slip under pressure of tools. Experienced spinners do not even stop the machine



4 **Lever tool,** pivoted to the tool rest and to a secondary lever arm, is used for spinning the metal down to the approximate form of the chuck. This operation could be performed with a plain tool, but would require unnecessary effort on the part of the operator



7 **Finished cone** is removed from the machine and is ready for final cleaning and polishing. Noteworthy in the spinning process is that the finished piece has the same diameter as the original blank, but the thickness has been reduced because of the metal flow



8 **Assembled Anemostat** consists of six separate, spun cones, each having a shape differing from the others. The 6-ft outer rings are among the largest aluminum spinnings made. Limited production makes spinning cheaper than punch press operations

ROUND TABLE

Television Eyes

"I'm about fed up with Thompson; that's my trouble!" Ed was slamming desk drawers and generally acting up when Al dropped in to see about lunch. "That guy—he's about half alive!"

"What's the matter, Ed, too much night life, or is it the terrible temptation of television?"

"One or the other, I don't know which—and don't care. All that bothers me is that he walks in here with bleary eyes every morning. He's dead on his feet—why, he can't even read a mike right until about two in the afternoon!"

"Maybe he's got some trouble in his private. . . ."

"Sure he's got trouble! He's got so much trouble he's going to get his walking papers if he pulls it about once more."

"Now wait a minute, Ed. Our labor turnover is too big anyhow these days. How about talking to him and seeing if you can straighten him out before you give him the boot?"

"Not me, Al. I don't believe in interfering in anybody's private business. The thing that gets me riled up is when Thompson's private life starts interfering with getting those new dies out. What he does on his own time is his own affair, but it better not louse up our production, or I'm going to see that we don't have to worry about him again!"

"Well, at least you admit that what he does on his own time has an effect on what he does here in the plant. Why not ask somebody in Personnel to talk to him? They're supposed to be available for that sort of thing, you know."

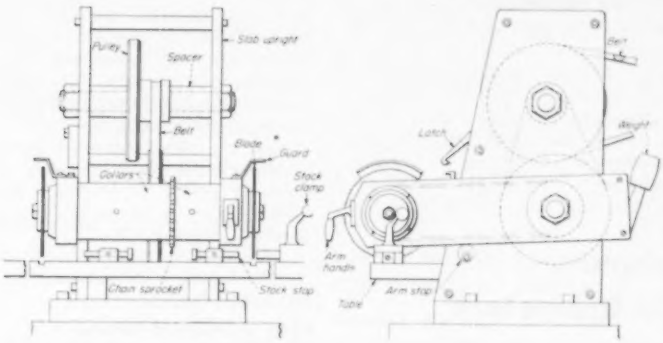
"No sir! I warned him once, and I'm not going to have anybody doing a middleman's job for me."

"The trouble with you is that you won't admit that a man's private business is our business, too—at least when it means he doesn't do a full day's work."

"That's just what I mean, Al. Either he does a day's work, or out he goes. It doesn't matter what the reason is. We want results, not a court of domestic relations."

***IS A MAN'S PRIVATE BUSINESS** his own concern and nobody else's, or has his employer a right to inquire or interfere when his private business affects his work? Is Ed justified in firing Thompson without regard to the cause of Thompson's bleary eyes, or is Al right in suggesting that Thompson's private business is also Ed's? Reactions to earlier topics appear on later pages.*

Practical Ideas



Rocking-Arm Miller Cuts Short Stock Lengths

WORK WE DO regularly calls for various lengths of bar stock, up to 1-in. diameter, which must be cut to size. Instead of taking up valuable turret-lathe time to do this simple job, we cut stock on a rocking-arm length miller, made up from standard steel sections, old bushings, and disk pulleys which were laying around the shop.

The bench machine was built up from a solid base between two slab uprights. For rigidity, we fitted all driving pulleys on dumbshafts which were bolted solidly through the uprights, and which helped to hold the uprights steady.

The rocking arm was pivoted on the lowest shaft, which was suitably extended. Drive is from a motor mounted on the bench behind the miller. A V-belt drives the upper shaft, and a second V-belt reduces speed down to the lower shaft. Power is transferred to the spindle through a chain and suitable sprockets. The spindle is double-ended and carries two 3-in. to 4-in. saw blades which operate at 150 rpm. If long pieces are to be cut, one saw is removed.

The spindle is assembled with suitable bearings and collars which are separated in the middle to allow the spindle sprocket (keyed in place) to extend beyond the collars. Guards are mounted over each saw, and the rocking arm is equipped with a handle, a latch arm which will hold it up when it is not working, and a counterbalance at the rear.

Weight of the arm is balanced by the counterweight so the blades will cut at about the right speed if simply released over the work. However, the counterweight is adjustable, so it can be moved back when light work is to be cut, or forward when tough material is cut. An eccentric adjustable stop is located under one arm on the side to keep the blades from dropping into the table. This is held in position by a setscrew.

Workholders, with clamps, and stops are fitted to the table so stock can be inserted, moved up the proper distance, cut off, and then dropped into a container in front of the machine, where the saws will throw cut-off parts into it because they rotate clockwise (from the right side).

An extension table is located next to the bench so long work can be handled, too. The original setup should be made carefully, with all parts squared and located accurately, so the blades will cut square and accurately. *Dan Penway, Carlisle, England.*

Aerator Smooths Coolant Flow

FLUSH COOLING on operations where high spindle speeds are required produces best results as far as carrying away friction heat goes, but it is annoying to the operator because of splash. One good way to keep everything in the vicinity from getting doused is to attach a common water aerator—like those used in kitchen sinks—to the feed line.

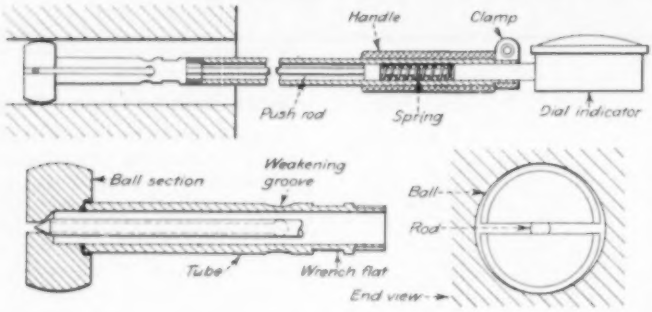
An aerator may require frequent cleaning with an air hose to dislodge small particles in the soluble-oil coolant, but the result in eliminating the mess is worth a little extra trouble.

Because aerated coolant clings to the work longer, it also has more effective cooling powers, so the rate of flow can be reduced somewhat below normal requirements. *John P. Uetz, Philadelphia, Pa.*

Stripper Bolts Formed With Headless Screw

THIS METHOD of forming stripper bolts and shoulder screws seems to work better than turning down and threading a full-size socket-head screw for special jobs;

Long socket-head screws which do not have threads all the way back to the heads are cut off and drilled; then tapped. Small headless screws are then driven into the tapped holes—usually 6-32, 8-32, or 10-32 threads. Once these are tight, they hold in place like locknuts in the blind holes. *Oliver E. Woodward, Flint, Mich.*



Dial-Indicator Attachment Measures Deep Hole Diameters

WHERE conventional diameter-measuring tools cannot reach into long bores, an easily made gage member may be added to a dial indicator (with the desired scale) to transfer the diameter out to the indicator where it can be read.

The device works on an expanding-gage principle. A ball is turned to about the shape illustrated, then is drilled almost through and counterbored to fit a long tube that will fit over the fixed shank of the indicator. Ball and tube are assembled and brazed together, then both are split accurately down the middle with a saw to the length desired. This length depends primarily upon the amount of play desired in the gaging surfaces of the ball. Flats for a wrench are ground on the tube (to simplify assembly to the indicator), and weakening grooves are also ground.

A plastic handle is added to the tube near the indicator, and a clamp is fitted to hold the tube to the indicator. Assembly is made with a spring working outside the moving indicator spindle between the end of the fixed indicator shank and the face of a brass thrust collar on the end of the push rod.

The push-rod end is ground off at an included angle of 26½° and is hardened for long wear. Hardening the ball is not necessary. This pointed end works against the edges inside the ball left by the intersection of the drilled hole and the sawed slot. The angle should be ground accurately because it produces increments on the dial which are exactly equal to the motion of the gaging surfaces (on the diameter).

Thus, when the gage is compared to a standard dimension on a micrometer, for example, and is set to zero, an oversize reading on the hole of two thousandths indicates that the diameter of the hole is actually two thousandths of an inch oversize. *Clifford T. Bower, London, England.*

Lathe Collet Has Replaceable Pads

REPEATED RECESSING is often necessary to fit different work into standard lathe collets. Eventually a collet that has been handled like this is turned down so far that it cannot be used any more.

A shop-made collet can be equipped with three low-carbon-steel pads which may be turned down to any shape and diameter required, and can be easily replaced when they are worn down too far. The face of the collet is turned with a ridge which will fit into a corresponding groove in the back of the collet pads. Three small screws are used to assemble the pads against this face. The collet is otherwise conventional, having three expansion cuts.

Pads are made from solid stock. The centerhole is drilled small so there is plenty of material for forming various recesses. *Joseph Macieski, Nutley, N.J.*

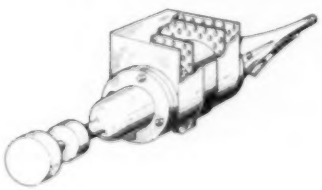
Air-Tool Muffler Cuts Annoying Whine

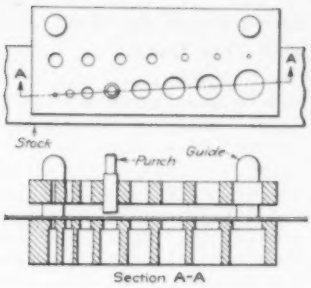
THE SIREN-LIKE NOISE produced by many turbine-driven drills, wrenches, and grinders is a function of vibrations produced as the air escapes from the valve and acts on the turbine. Such a noise, if heard constantly, can put workers on edge—resulting in less or bad work.

A muffler made from sheet metal and adapted to the air tool can cut this noise down so it will not be nearly as bothersome. One was made for a small hand grinder that cut the noise down to that made by an electric motor, and after tests it was discovered that the muffling had no appreciable effect on rpm.

A simple sheet-metal housing was made to cover the tool, and three perforated plates were added. These allowed the air to exhaust toward the air line. The metal on all other sides and one end was solid sheet.

The number of 5/32-in. holes necessary to provide both quietness and full power may have to be determined by experiment for different tools. *Thomas Ash, Rancocas Woods, N. J.*



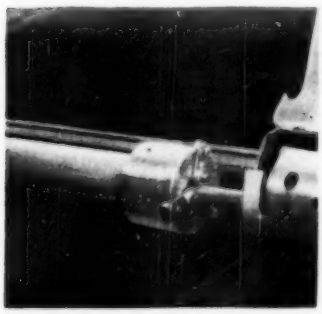


Punch Set "Drills" Sheet

THIN STOCK is difficult to drill without tearing unless a sandwich, with either thicker metal or wood around the stock, is made. But stock thin enough to give trouble to a drill can usually be punched.

A handy set of punches can be made to take care of everything but odd sizes or large sizes. This has the advantage of being a complete unit, with properly ground cutting surfaces and accurately aligned punches.

Punches are made from hardened drill rod. The die and guide plate are hardened and ground steel, and are fitted with two aligning pins. Punch sizes from 1/16 in. up to about $\frac{5}{8}$ in. are convenient. *Rocco Boccia, Corona, N. Y.*



Bar-Feed Steadyrest Prevents Stock Whipping

TO STOP bar stock from slamming around in the feed tube of a pneumatic bar feed in our shop I made a stock rest. It is nothing more than a cap, which slips over the end of the feed tube, that carries slotted arms and ball bearings in three grooves.

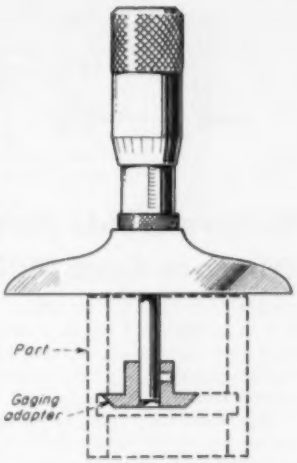
The cap is held in place by setscrews. Bolts through the arm slots into the cap grip the arms in place, yet allow adjustment. A single bearing at the end of each arm rides on the stock and centers it.

Results with this rest were a quieter machine, better concentricity of stock, and less damage to the stock and feed tube. *James R. Dorl, Milwaukee, Wis.*

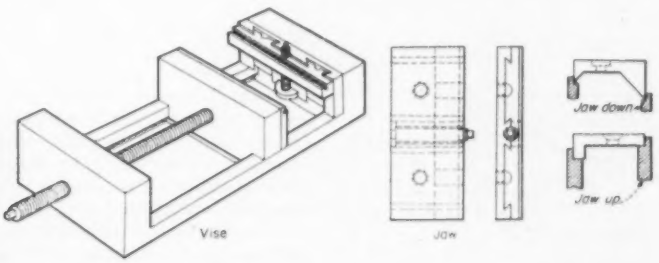
Internal Grooves Spaced With Micrometer Adapter

GROOVES machined inside drilled and reamed holes can be checked for distance to the end of the hole with a small adapter that can be added to a depth micrometer. It has a beveled edge.

The adapter can be turned and drilled to the shape illustrated. For accurate location on the spindle of the micrometer, the shank of the adapter can be cut to a convenient even dimension so the micrometer can be set to that figure, then the adapter located on the spindle and clamped flush against the anvil.



The clamping screw should be brass or another soft metal so it will not mark the spindle of the gage. *Leonard Maunu, Milwaukee, Wisconsin.*

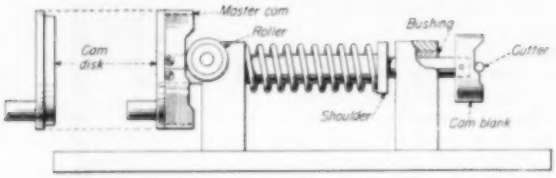


Vise Jaw is Adjustable Up and Down

DRILLPRESS, milling-machine, or surface-grinder vises can be fitted to handle uneven work that must be machined off level on the top with one or two of these adjustable jaws. The design allows the jaw to be raised or lowered to grip a surface that is at a different level than the opposite lower edge of the part.

There are only three parts: a fixed plate, an adjustable jaw which is dovetailed to the fixed plate, and an adjustment screw which is operated from above the vise. All parts are made from mild steel, pack hardened and ground (except the screw, which is not ground).

The use of such jaws, in many cases, eliminates the need for special fixtures, and in doing so cuts the cost of tooling for short-run jobs and sample-making. *Allan B. Nixon, Springfield, Mass.*

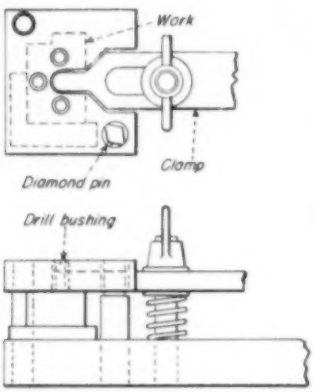


Fixture Holds Master For Face-Cam Milling

SMALL FACE CAMS are cut either on a milling machine or on a lathe with a simple shaft fixture that allows following a sheet-metal master cam.

The master-cam shape is laid out on a piece of sheet metal which is drilled and wrapped around the cam desk and screwed in place. Two sturdy bushings on a base-plate support a long shaft. A compression spring exerts pressure between a shoulder on the shaft (near one bushing) and the opposite bushing. At the cutter end of the shaft, the cam blank is fixed with a setscrew. The other end of the shaft is fitted with a suitable mount for the cam disk, which is held tight. The cam roller, fixed permanently to the back bushing support, works against the master cam.

The master-cam layout must be formed to the same dimensions as the cam that is being cut as far as depth goes. However, changes in profile around the circle must be located in proportion to the dimensions of the cam being cut. The ratio of the diameter of the cam roller to the diameter of the milling cutter should be the same as the ratio of the diameter of the master disk to the diameter of the cam.—*Frank Biechele, Brooklyn, N. Y.*



Drilling-and-Tapping Jig Cuts Handling Time

BOTH OPERATIONS — drilling and tapping—were done on the same jig for a small part of irregular shape which was produced in quantity. This cut down the time required between the two operations, which were normally done on separate machines. An additional time saving is possible if a two-spindle machine is used.

A workpiece was located on the jig base against a corner formed by two strips screwed to the base. The jig plate was then slipped over the two locating pins, one round and one diamond shaped (described in an earlier Practical Ideas section). Finally, the clamp was moved up and seated on the part in the cutaway in the jig plate, and tightened.

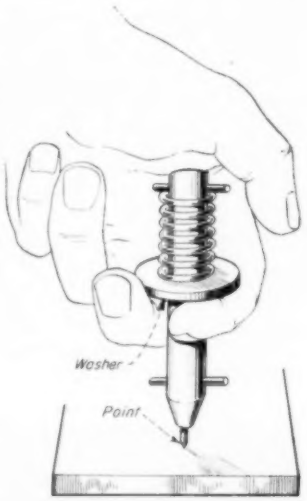
After drilling, the jig plate was lifted and removed so the tap could work the holes. Because the jig plate was cut away so the clamp could grip on the part between the holes, the work did not shift during the operation. *Anthony Gabriele, Brooklyn, N. Y.*

Spring Punch Operated With One Hand

SCRAP MATERIAL was cut up to make a simple punch that can be handled when one hand is busy holding a jig or die.

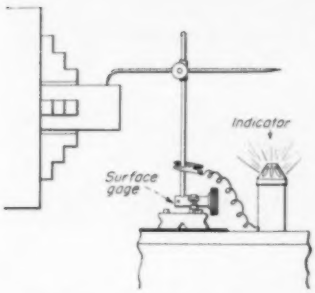
The punch body is a $\frac{3}{8}$-in. rod about 4 in. long, drilled in the end so a small hardened point could be pressed into place. Two pins through cross holes confine a compression spring and a fairly large washer under it.

In operation, the punch is held with the top end of the body in the palm of the hand and the fingers



catching on the washer. When the point is located on the layout where the mark is to be made, the operator pulls up on the washer, compressing the spring, then releases it. The impact of the spring against the bottom cross pin marks the work.

The punch must be held vertical, or it will jump, and a fair amount of pressure must be exerted downward by the palm of the hand. A large, heavy washer that is quite thick is the best kind to install here, because the more mass moved by the spring when it is released, the deeper the punch mark will be. *Federico Strasser, Santiago de Chile.*



Light Indicator Centers Chucked Bar Stock

EXPENSIVE dial indicators can be done away with when bar stock is centered in a lathe chuck with a battery-operated indicator. The device consists of a flashlight cell, a small bulb, an aluminum container, a spring-fitted wooden end plate, and a wire lead with an alligator clip.

First the work is chucked, and a conventional surface gage is located on the lathe's saddle with the feeler spindle next to the work. The assembled indicator is set on the saddle next to the surface gage, and the clip is attached to the gage's spindle. Because the circuit grounds on the lathe, a current will flow to light the lamp when the surface-gage feeler touches the work.

Rotating the work will give intermittent light, so the work can be adjusted until the feeler barely touches the work, but the light is on most, or all, of the time. If the feeler is held too tightly against the work, centering will not be accurate, nor will results be good if the lamp lights only once in a while. The method is more accurate than marking the work with a piece of chalk held in hand because the support is steady. It is easy to set up, and is easy to keep handy for odd jobs.

Precision work, and work that has been turned to remove the skin, can be centered quite accurately this way. *J. D. Horton, Birmingham, England.*

Drillpress Tapper Has Sensitive Action

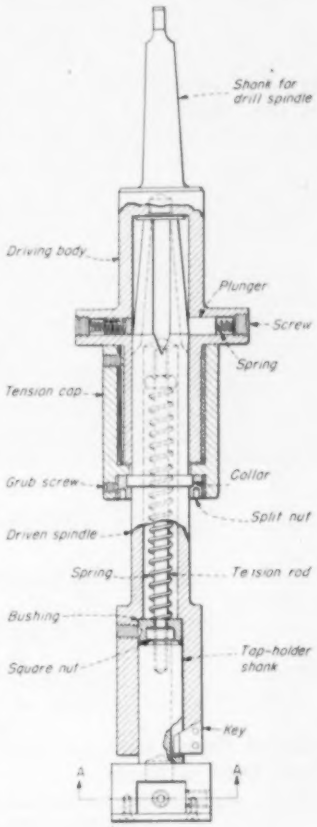
DESIGNED for use with a small sensitive drillpress that has a reversible spindle, this tapping head will handle small-diameter threads in both blind and through holes. Its action is built around a compression spring, which makes the tapper act with only slight guidance from the drillpress feed lever.

The driving body contains four spring-loaded plungers, with rounded and hardened ends, which engage in four slots along the top end of the driven spindle. Driving torque transferred to the driven spindle is adjusted by moving the tension-adjustor cap up and down on the threaded end of the driving body. This adjustor is prevented from rotating by a grub screw that fits into a shallow vertical groove down the side of the driving body, and by another screw that engages a split retaining nut that grips on a collar on the driven spindle.

At the bottom of the driven spindle, which is bored out, the tap holder is assembled with a tension rod, compression spring, square nut, and a bushing with a square centerhole to fit the square nut. A grub screw through the wall of the spindle holds the bushing in place. A driving key at the tip of the spindle engages a key slot in the holder so drive will be positive.

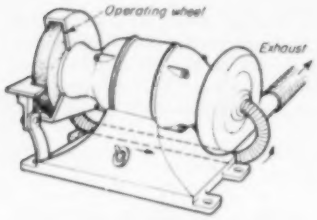
In operation, the tap is approached to the hole. When the tap has started in the hole, the machine spindle is held steady. The tap continues cutting downward, which compresses the spring on the tension rod. When the tap is reversed, a slight upward pressure on the feed lever insures that the tap will clear the hole coming out and will not damage the last few threads.

The spring arrangement prevents damaging threads in blind holes,



Section A-A

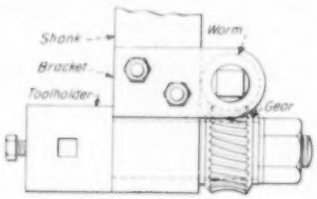
and the tension adjuster and spring-loaded plungers prevent damage if the tap should hit a hard particle in the drilled part and should stop rotating. *R. B. Wolverhampton, Staffordshire, England.*



Bench Grinder Collects Its Own Dust

A BENCH GRINDER may be altered by means of sheet-metal work to serve as its own dust collector. One wheel is dismounted and is replaced by a fan.

The suction fan may be an old vacuum-cleaner rotor, and should be housed so dust may be drained from the operating wheel to the center of the fan. An exit line from the fan leads to a bag or to the outside air. Flexible-metal pipe should be employed on all lines to cut fire danger. *Robert Roedder, Berwyn, Pa.*

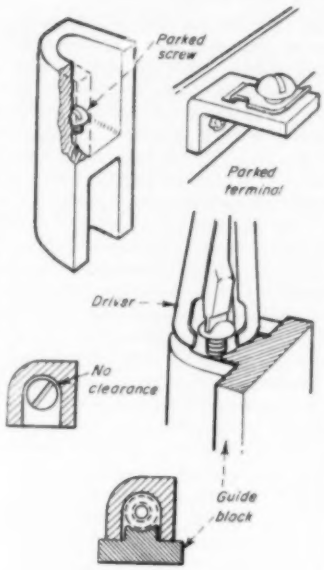


Geared Planer Tool Cuts Radii in Molds

SPECIAL BRASS and copper rods had to be cast in steel molds of 4-ft lengths. The split mold pieces could have been bored out on a lathe, but this would have been slow work. After a rotating toolholder was adapted to a planer, the molds were cut on that machine.

A heavy mild-steel shank was fitted with a slotted toolholder that carried a worm gear, washer, and nut on its threaded end—on the other side of the shank. The holder was rotated by a worm supported between two brackets on the shank. Although for this job the square shank on the worm was turned after each pass of the planer table with a wrench, it can be adapted easily to turn automatically on a cam-and-ratchet linkage which could be tripped by the table.

A set of molds was turned out with the rig in two hours after the equipment had been arranged. *K. M. Natarajan, Madras, India.*



Parked Screws Cut Assembly Work

MADE possible by a new power screwdriver (Shakeproof), screws for electrical assemblies can be located at one point on an assembly line and left to be tightened when final assembly is made later. This parking eliminates screwing them down initially, then loosening them so another part, such as a wire, can be added later. Tightening is done with a conventional screwdriver.

Power-driving a screw into a part where there is no clearance around the hole for the screw catcher on the driver is another problem. This can be simplified by holding a guide block against the part to confine the screw as it drops into the threaded hole. *C. S. Ricker, Grosse Pointe, Mich.*

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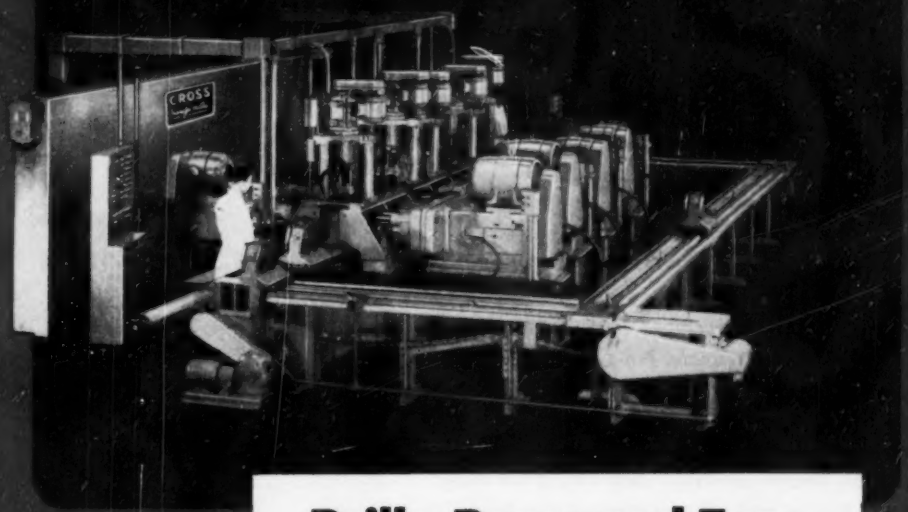
98th Winner:

Frederick G. Hauck

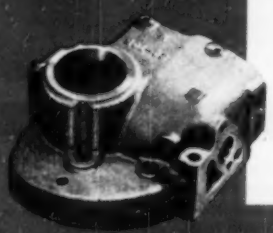
Carbide Chip Breaker

Another Transfer-matic by Cross



Drills, Bores and Taps

Automatic Transmission Extensions



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Estimating Hobbing Time

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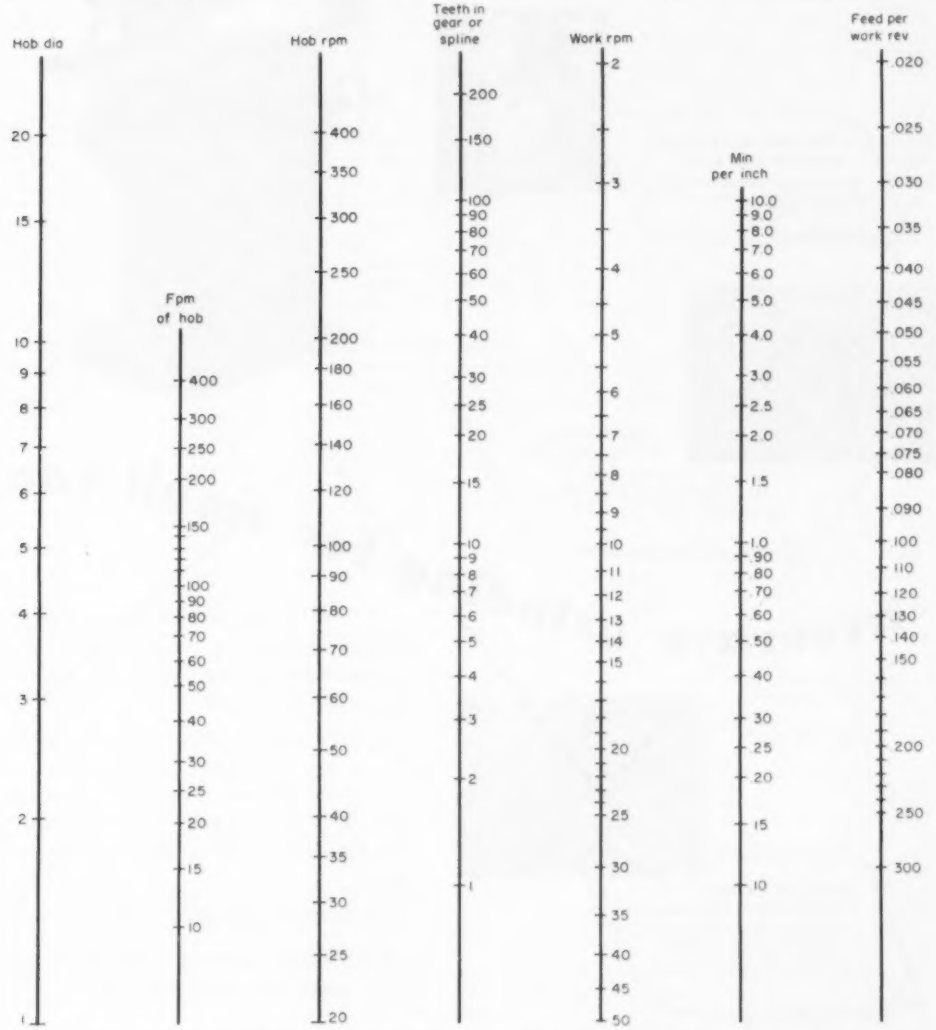


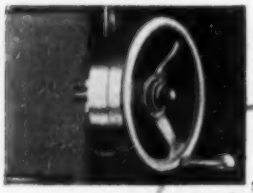
EXAMPLE: Given 3-in. dia single-thread hob, cutting speed, 110 fpm; 6 teeth in spline or gear to be hobbed, 0.75-in. feed per rev of spline shaft or gear blank.

1. Connect 3-in. dia and 110 fpm and get approximately 140 rpm.
2. Connect 140 rpm and 6 teeth and get approximately 23.3 rpm of spline shaft or gear blank.
3. Join 23.3 rpm of spline shaft or gear blank and 0.075 in. feed per rev of spline shaft or gear blank and get approximately 0.57 min per in. (length of cut).
4. Multiply total length of cut in inches (including any approach distance, stand-off, and over-run) by 0.57 min per in.

NOTES:

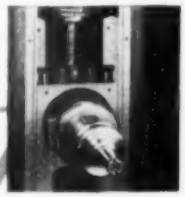
If the diameter of hob, fpm of hob, number of teeth in gear, and min per in. are given, the feed per revolution of the gear can be found. If the feed per revolution of the gear, min per in., number of teeth in the gear, and fpm are given, the diameter of the hob can be found.

If a double-thread hob is used, use only one-half the teeth in the gear or spline shaft to be hobbed. If a triple-thread hob is used, use only one-third the teeth in the gear or spline shaft to be hobbed.



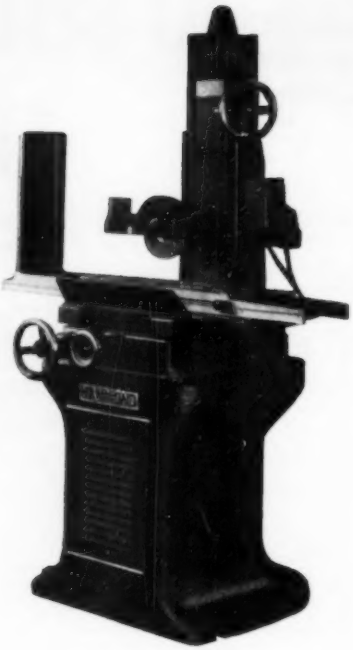
ACCURATE SPINDLE ADJUSTMENT

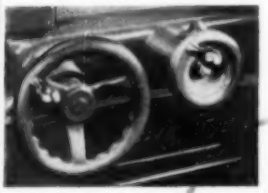
Standard vertical adjustment of spindle through handwheel is .0005". With Vernier attachment, spindle can be raised accurately to .00005".



SOLIDLY SUPPORTED SPINDLE CARRIER

Spindle carrier is moved vertically on double dovetail ways with adjustable tapered gibs.

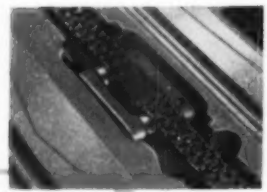




CONVENIENT HAND CONTROL

Handy wheels for cross travel, accurately gauged by thousandths, and quick acting longitudinal travel.

accurate grinding for small tools



SMOOTH ROLLER CHAIN TABLE DRIVE

Remarkably smooth finish on work without chatter marks frequently found when table is moved by conventional means through rack and pinion.

• The Hammond No. 2, 6″x18″, Surface Grinder is a precision tool room machine for use on the most accurate gauge and tool work.

The standard spindle is direct motor driven and is mounted on precision preloaded ball bearing. Total vertical adjustment is 10¼″. In and out movement of the table is 6½″ with a longitudinal travel of 18″.

Write or wire for further information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

FOOTBURT-HAMMOND SURFACE GRINDER

a time tested line of machine tools

Cleaning Copper Parts

COURTESY BRIDGEPORT BRASS COMPANY

During fabrication, the metals may become coated with lubricating oils, drawing compounds, greases, oxides, dirt, metallic particles or abrasives. These may be removed thus:

Solvent Cleaning. This process is used for removing the greater portion of oils from coated pieces, by immersing in a solvent halfway between kerosene and gasoline. Steel tanks are used. Centrifuging removes excess solvent and pieces are practically free from oil. Solvent cleaning is often used for screw-machine work.

Degreasing. By vapor degreasing quick removal of oil is secured. Condensate washes away the oily coating, leaving the pieces clean and dry. The degreasing unit is self-purifying—oils and waste accumulate at bottom. Solvents used are generally carbon tetrachloride and trichlorethylene.

Alkaline Scouring—Hot alkaline cleaning baths are used primarily for the removal of oils, greases, solid particles of dirt, and metal particles. The chemicals saponify or make soap of vegetable and animal oils and fats, emulsifying mineral oils and greases and suspending the solid material. The soil is either removed from the metal surface or its tendency to cling is greatly reduced.

Caustic soda, soda ash and causticized soda form the cheapest and most direct method of producing alkalinity in the bath. However, sodium metasilicate, trisodium phosphate, and similar salts are often used.

Emulsion Scrubbing — Proprietary preparations comprise an emulsification agent that disperses organic solvents in water solutions. Emulsifiable cleaners are miscible with oils and can be washed off with water, although a slight film of oil may remain on the work and necessitate a subsequent alkali cleaning treatment. Dragout costs are high.

Electrolytic Cleaning — Alkaline materials are used in electrolytic cleaning. The bath is maintained as near boiling as permissible without excessive tarnishing. Work to be cleaned is usually made the cathode.

Tarnish Removal—Brass and copper articles often become discolored or tarnished on standing or during the course of alkaline cleaning. This tarnish can be removed when work is free from oil or grease by immersion in a solution containing 4 to 8 oz of sodium cyanide per gal. After discoloration has been removed (usually a matter of seconds), pieces should be thoroughly rinsed. Sodium cyanide is poisonous.

Pickling—This operation removes oxides developed from annealing. Sulphuric acid and hydrochloric acid are commonly used. Either sodium, bichromate or ferric sulphate are used in combination with an acid to remove red stains on brass or to produce a special surface effect. After pickling, it is important that metals be well rinsed and, if permissible, immersed in a neutralizer to remove the last traces of acid.

SULPHURIC ACID PICKLE

Sulphuric Acid	¼ to 1 gal.
Water	4 gal.
Temperature	100 to 160 F

This is used often after an annealing operation where scale and tarnish have been developed. The heavier the scale, usually the more concentrated and the hotter the pickle.

SODIUM BICHROMATE PICKLE

Sulphuric Acid	¼ gal.
Water	4 ½ gal.
Sodium Bichromate	2 to 5 oz per gal.
Temperature	80 to 120 F

If pieces remain too long in this solution, or solution is too concentrated, some pitting or etching may result. When properly operated, the solution will give a clear non-glossy yellow finish. Sodium bichromate pickle is used for removing red stains which remain after sulphuric acid pickling.

BRIGHT DIP SOLUTION

Sulphuric Acid	2 gal.
Nitric Acid	1 gal.
Water	1 qt
Hydrochloric Acid	1 oz. to 5 gal.
Operate	Room Temperature

To obtain a gloss, a bright-dip solution is required. Increasing the nitric acid makes the solution more active. Increasing the sulphuric acid slows down the action.

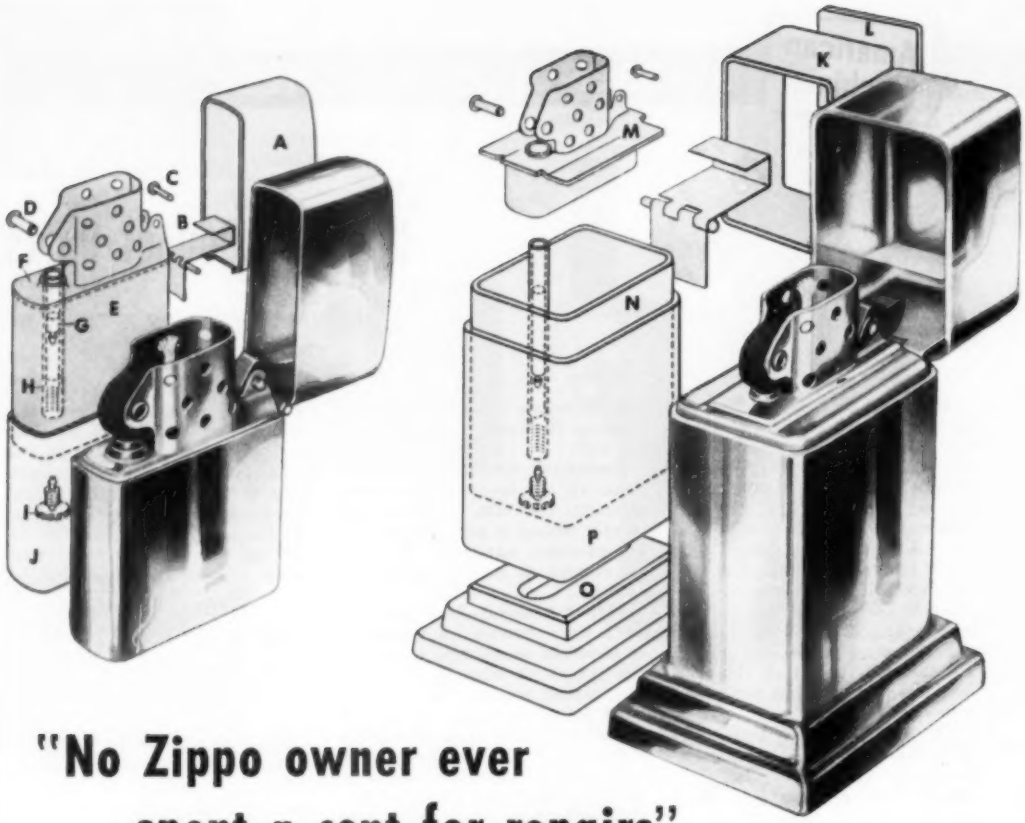
Scale Dip—Preliminary preparation of the surface is sometimes necessary before immersing the pieces in the bright dip, especially when a very bright smooth surface is desired.

(a) Where very heavy cutting of the surface is desired, use concentrated nitric acid.

(b) For milder treatment, use the formula:

Nitric Acid	1 gal.
Sulphuric acid	1 to 2 gal.
Water	1 to 5 gal.

The above solutions are quite active and must be used with care to prevent attacking the brass too deeply. After the bright dipping, either preceded by scale or bichromate dipping, the work should be thoroughly rinsed in water, immersed in a 2 to 4 oz solution of sodium cyanide followed by thorough rinsing. Then immerse in 1 oz solution of neutral soap and thoroughly rinse. Omit the soap solution if pieces are to be soldered. Ferric sulphate can be used instead of sodium bichromate, and is preferred where attack of the base metal must be minimized.



"No Zippo owner ever spent a cent for repairs"

That, in effect, is the unconditional guarantee which accompanies each of the many millions of lighters produced by the Zippo Manufacturing Company of Bradford, Pa. To make such a policy pay, returns for repairs must be held to a minimum.

How does Zippo do it? First, the design of the lighter is excellent. Second, meticulous care is employed in fabricating, assembly and finishing. And third, let's not overlook the fact that the Anaconda Copper Alloys used for the components illustrated were carefully specified for composition, grain size, form and temper.

Moral: Your product will be worth more if it's made of brass, even if it costs more. And very often the extra metal cost is offset by longer tool life and lower fabricating costs . . . in lower plating and polishing costs . . . in a longer, rustless, usually expense-free service life. We'll be glad to help you find out. Address The American Brass Company, Waterbury 20, Connecticut. In Canada, New Toronto, Ont.

POCKET LIGHTER A and J, top and bottom of outside case, deep drawn from brass strip. B, nickel silver hinge and pin. C, solid brass cam rivet. D, tubular brass rivet for flint wheel. E, nickel silver inner shell and chimney. F, nickel silver top plate. G, brass flint follower. H, seamless brass flint tube. I, brass flint tube screw.

TABLE LIGHTER K and P, special shape seamless brass tube for top and bottom outside case. L, brass top plate. M, brass chimney seal plate. N, special shape seamless brass tube, telescopic fit. O, die pressed brass forging. Chimney unit and its components are the same as the pocket lighter. Both lighters are finished in gleaming chromium plate.

ANACONDA

the name to remember in

COPPER, BRASS & BRONZE

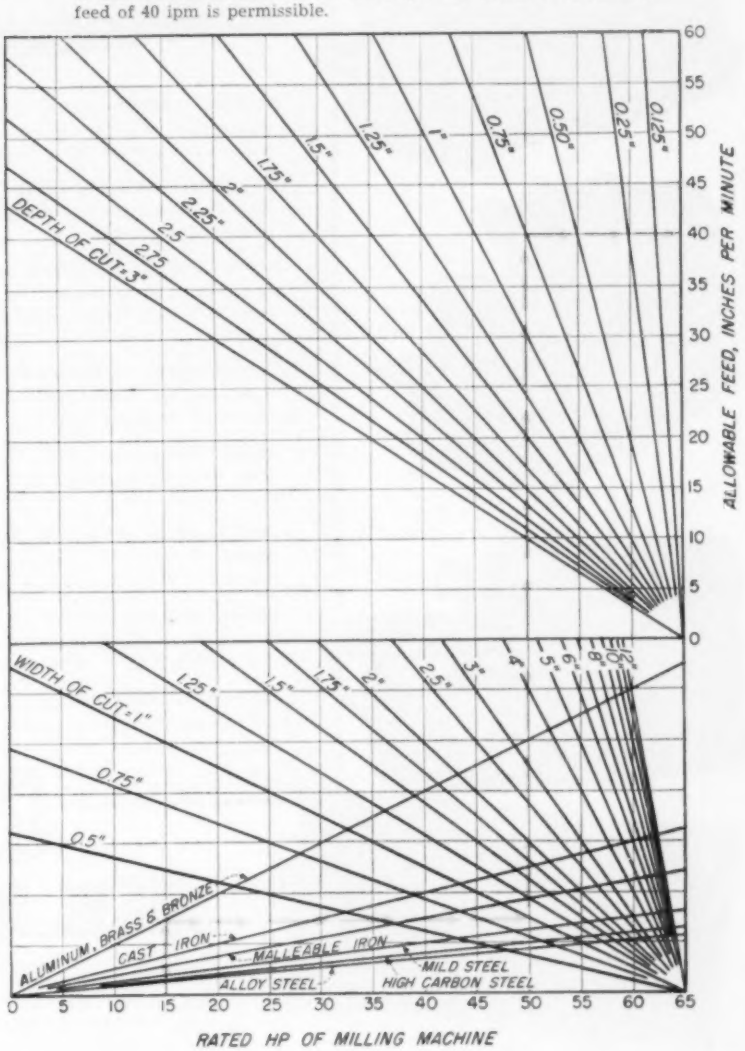
Milling Feeds for Cutting Helices

BY TYLER G. HICKS

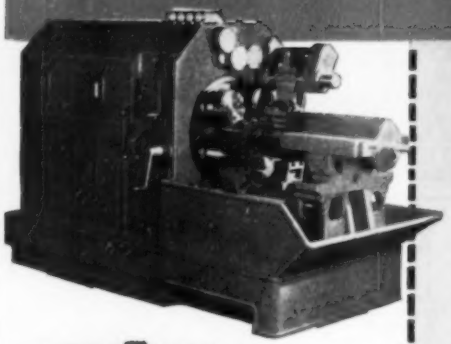
This chart permits determination of the feed to mill a helix, using a knee-type machine, without looking up the constants for various materials. The formula is:

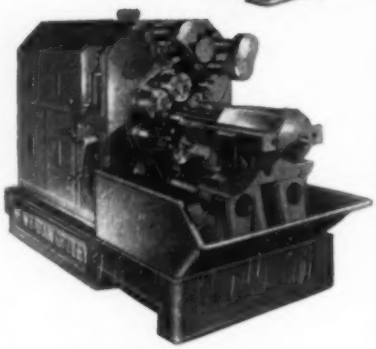
$$\text{Feed} = \frac{\text{Hp} \times \text{cutting constant}}{\text{Cut width} \times \text{cut depth}}$$

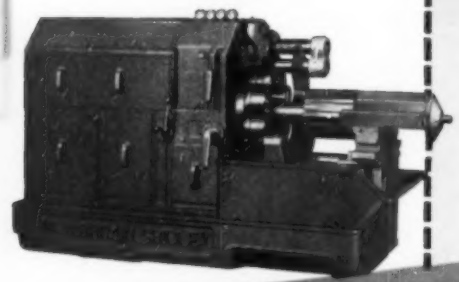
The example shown solves for feed when a 15-hp machine is used to take a cut 1 in. wide by 0.75 in. deep in brass, and shows that a feed of 40 ipm is permissible.



SPECIAL FEATURES...
mean better production methods







NEW BRITAIN *Automatic* 4-6-8 Spindle Chuckers

HYDRAULIC CHUCKING for simple positive control and rapid action. Chucking pressures automatically reduced in finishing positions, if necessary to prevent distortion.

FLAT CROSS SLIDES AND SWINGING TYPE FORMING ARMS make New Britains equally adaptable to heavy cuts and a wide variety of types of work.

SPINDLE STOPPING MECHANISM positions spindle automatically in loading position, or any other position necessary to perform work requiring a dead spindle. A safety device prevents carrier index before completion of chucking operation.

CARRIER LIFTING, LOCATING AND LOCKING MECHANISMS during index preserve initial accuracy by eliminating both wear and weave from the spindle carrier.

DOUBLE INDEX of spindle carrier with loading in two positions permits finishing both ends of a piece in a single cycle, or two pieces per cycle.

ACCELERATED OR DECELERATED MOTION, separate from turret, changes feed rate of any end working tool for different operations. Drill speeders in all positions.

ANTI-FRICTION BALL BEARING on hydraulic chucking distributor eliminates the wear and heat of metal-to-metal contacts and permits high spindle speed.

OPEN END CONSTRUCTION provides complete accessibility to the tooling area, and easy chip removal.

These important mechanical features are the basis for the adaptability and accuracy of New Britain chuckers and the new, better machining methods they make possible. May we send you the portfolio "It Can Be Done." It contains numerous cost histories showing the results in terms of cost-per-piece and pieces-per-hour. Frequent supplements are issued to those who request this valuable service.

649MJ1

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

TALKING SHOP

Cooperative Cut

WHEN Illinois Commerce Commission ordered a 25% cut in electric-power use, Diversey plants of Stewart-Warner continued full-scale operation—by putting the problem squarely up to the workers and asking their cooperation. Many other Chicago-area plants simply cut the work week. Among steps taken at Stewart-Warner were removal of every other light bulb throughout offices and plants, curtailment of elevator services (particularly of passenger elevators), reduction of air-makeup units in production areas (within limits of health requirements), stopping of motors except when machines are actually in use. Power use was checked each day, and the workers told that as long as total cut was 25% or better, full-scale work could continue, with no loss of production or take-home pay.

Higher Speeds

INCREASING INTEREST in high metal-removal rates brings to light the inadequacies of the speed and feed ranges in many present machines. In higher ranges, speeds and feeds are more critical than in lower ranges. One large manufacturer has declared that if machine-tool builders will equip their machines with high-hp motors, infinitely variable feed and speed ranges, and carry these into a much higher bracket than is presently available, he may find it advisable to reequip his plant completely with such new machines. The total number of machines, of course, would be lower than at present, because of higher productivity, but each would cost more.

Air Cracks Metal

WORKING on the old harmonica principle, a new General Electric device tests the strength of metals by vibrating test strips in the path of rushing air. In the pneumatic tester, compressed air vibrates the test strip until it cracks. The number of vibrations needed to produce failure indicates the metal's strength. On each vibration, the strip intercepts a beam of light, and the exact frequency, or number of vibrations per second, is recorded by electric eye.

Hot Papa

CHROME-PLATED gage blocks take longer to wring together than unplated ones, hence pick up more body heat. A gage maker found this out suddenly because a group of close-tolerance gages were rejected. On checking, gages were found to be all right; the customer's inspector had not allowed sufficient time for a wrung-together group of chrome-plated blocks to stabilize in temperature. The gage maker suggests that time allowance for stabilizing chrome-plated blocks be double that of unplated ones to avoid misreading because of body-heat pickup.

Variation

A MAJOR OBSTACLE to extremely high-speed machining seems to lie in the lack of uniformity in the material. Two forgings taken from the same lot and given identical heat treatment may show wide differences in machinability, and two pieces of bar stock rolled from the same heat frequently exhibit similar wide differences.

Recent investigations by a large manufacturer, with an electron microscope, indicate that free carbides may be at the root of the trouble. Where there are free carbides, tool life has been found to be low. With a ferritic structure, life is medium; but with a pearlitic structure life is high. Research seems to indicate that a short-cycle, low-temperature anneal will eliminate free carbide.

If manufacturers can guarantee uniform machinability by proper heat treatment of the material, machine-tool builders will be able to furnish machines capable of much higher production and will be able to guarantee the production rate over long runs.

In this connection it is important that a uniform nomenclature be developed for the factors involved in tool life, so there will be no confusion when comparing one company's standard with another's.

13 Helpers

THE AVERAGE U. S. factory worker now has the equivalent of 13 helpers on the job, thanks to electrical energy. E. C. Brodin, director of mfg research for SKF, points out that American factories have 18 million installed horsepower, each equal to 10 working men. There are 14 million industrial workers, making the ratio of 1 to 13.

In Metalworking, the figure would be higher. At SKF's ball and roller bearing plants, for example, the average employee has 4.3 hp at his command — the equivalent of 43 helpers. That compares with 3 hp—or 30 men—back in 1940. Yet there are fewer unemployed now than then. Do machines take jobs — or make them?

New president of ASTE is Herbert L. Tigges, executive vice president of Baker Bros., Toledo

Philadelphia Tool Show Hailed As Best in ASTE History

PHILADELPHIA—Getting off to a fast start with over 2500 registrations the first day, the ASTE Industrial Cost-Cutting Exposition here April 10-14 was probably the most successful tool show in the Society's history. Total registrations for the week were approximately 14,000, not including some 3000 students and 6000 exhibitors' representatives.

Gages and gaging equipment took up considerable space. Bryant Chucking Grinder Co. exhibited its just-redesigned, portable, internal thread gage (a dial comparator). Like the bench gage, the frame is now a pair of aluminum castings, each of which carries a gaging member. Gaging members are actually a pair of threaded half-studs with narrow, non-threaded sections to guide the test piece on. They then expand sideways under pressure of an adjustable leaf spring in the handle. Castings are held in alignment by a pair of steel reeds. These simplifications, plus use of 2-element rather than 3-element gaging, cuts gage cost about 60%.

• **A real "stopper"** was provided by Pratt & Whitney's first public demonstration of atomic energy applied to industrial gaging. The unit, designed in co-operation with General Electric Co., is intended for continuous, non-contact gaging of strip material, and can handle wet, sticky, soft or highly polished materials equally well. Known as the Beta ray gage, it is essentially a weighing device which weighs a fixed area of the moving strip by a small beam of radiation. It can be calibrated to read in percent deviation, weight per unit area, or in decimal dimensions. Source of the rays is radioactive strontium which must be returned to the Atomic Energy Commission twice yearly for control purposes.

Also shown by P & W was a power gaging unit for thread gaging. The tool consists essentially of a standard taper lock thread member driven through a gear train by a constant-torque-output motor. A flexible shaft can also be used when it is desired to gage tapped holes which cannot be presented directly to the machine.

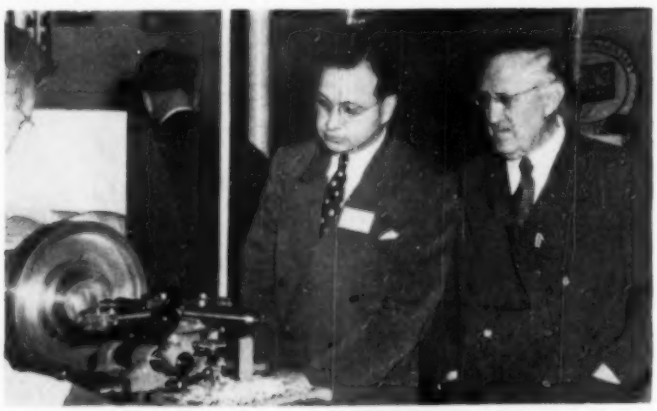
Other items shown by this company included solid carbide gage blocks in complete sets from 0.050 to 4 in., solid carbide thread ring gages, Air-O-Limit gaging plugs of solid carbide with integral nozzles, and a tri-roll thread comparator with interchangeable rolls which can be used for gaging 3-flute taps.

• **An entirely new**, adjustable-spindle air gage was shown by Sheffield Corp. Gage has a capacity of 1 to 2½ in. with a set of 12 cores and 2 blades. Contacts may be button, jet or blade type, and are adjusted by gage blocks in a master fixture. The indicating instrument is based on the standard Precisionaire, and the gaging unit may be used with an existing instrument.

A Selectionaire for mating inner and outer ball races was also demonstrated by Sheffield. This unit gives a direct reading of the size of ball required for the particular pair of races placed in the instrument. Different spindles can be applied for different sizes of races. For finished bearings, a radial play gage measures the actual radial play between the races.

Nilsson Gage Co. showed several new gages, including a dial groove gage for measuring circumferential grooves in holes up to 3 in. long. An

J. R. Longwell, left, assistant to the president, and K. R. Beardslee, vice-president and marketing mgr., Carboloy Co., Inc., discuss some of the company's new products



High productivity of the new Hardinge Brothers lathe gets some concentrated attention from D. R. Laux, executive vice-president, left, and D. G. Anderson, president, Hardinge Brothers, Inc.

outgrowth of this tool is another model that checks tapped holes and is easily rocked to various depth positions in the hole. Other gages are for checking internal and external splines.

A full range of steel and solid carbide gage blocks was shown by Webber Gage Co., together with a quick-acting clamp for combining blocks into a rigid unit. Angle gage blocks and a true square were also featured.

Illinois Tool Works demonstrated its sharpening measuring machine for checking spacing and rake of the gashes, and parallelism and runout of hobs and cutters, and the Toolograph machine which produces a graphic record of the exact location of the cutting edge of each tooth on a fine-pitch hob.

Machine Tools Featured

Of particular interest to production men was the manufacturing setup arranged by Hardinge Brothers, Inc. Five different production jobs were in actual operation on customers' parts, with an overhead conveyor bringing parts to the machines and delivering finished work to a packing and shipping room. Machines were tooled for maximum production, with as many as 12 operations being performed in a single setup. One machine featured an eight-station turret tooled with standard toolbits and producing work to 0.0005 in.

On the DSM machine, zinc die castings were threaded with a 7/16-24 thread at a speed of 3500 rpm. The new 11-in. general purpose screw-cutting lathe, Model HL, was also demonstrated. This machine has spindle speeds up to 3100 rpm, and a precision gearbox and leadscrew for threading only. A small motor attached to the apron provides independent variable feed for carriage and cross slide from zero to 4½ ipm.

• **A new type gear speeder** designed especially for checking planetary gear drives for the new automatic transmissions in automobiles was shown by National Broach & Machine Co. Lead checkers and spacing checkers were also demonstrated, as well as a wide range of unusual broaching jobs.

Hauser Machine Tool Corp. introduced its Type 3-S jig borer capable of operating at 75,000 rpm for

New ASTE officers (front row, from left): H. E. Collins, Hughes Tool Co., 1st v. p.; H. L. Tigges, Baker Bros., pres.; J. J. Demuth, Sligo Iron Works, 2nd v. p.; (Rear): G. A. Goodwin, Standard Electric Co., treas.; R. S. Waindle, Elgin National Watch Co., 3rd v. p.; W. B. McClellan, Gairing Tool Co., sec'y; W. A. Thomas, Ford Motor Co. of Canada, asst. secretary-treasurer

J. K. Fulks, vice-president in charge mfg., Ex-Cell-O Corp., left; A. A. Merry, chief tool engineer, Pratt & Whitney Aircraft; Phil Huber, president and gen. mgr., Ex-Cell-O Corp.; and H. G. Bixby, vice president and treas., Ex-Cell-O Corp. get together for an informal discussion

At the Pratt & Whitney exhibit, A. H. d'Arcambal, vice-president and sales mgr., small tool & gage dept., has an interested audience in A. W. Cordonna, Philadelphia district mgr., P & W, and E. Tempelmeier, Westinghouse Electric Corp.

Harry S. Conrad, executive secretary, ASTE, left, and James Y. Scott, president, Van Norman Co., and president, Morse Twist Drill Co.

C. Jeaness Cameron, sales mgr., left, and Gerry T. Attridge, chief experimental engineer, Lovejoy Tool Co. Attridge is the inventor of the new Lovejoy cutter

Carl Hirschmann, president Hauser Machine Tool Co., left, and John Hauser, director, Henry Hauser, Ltd., Switzerland, discuss the fine points of the company's new 3-S jig grinder

grinding holes from 0.020 to 8 in. in dia. Table capacity is 10x16 in., and maximum distance from table to spindle is 21½ in.

The brand-new Hauser P-324 optical measuring machine, specially flown from Switzerland for the show, attracted wide attention. This machine has no leadscrews, but gives direct readings to 0.00005 in. on the reticles of its microscopes. The same company also demonstrated Lambert gear hobbers, Safag pinion cutters and cutter grinders, and Hauser burnishing machines.

National Jet Co. exhibited two new microdrilling machines, one of which is capable of drilling holes as small as 0.00025 in. in stainless steel. This machine is unusual in that it has no chuck or spindle. Instead the drive pulley is attached to the drill shank which runs in ruby or sapphire V-ways. Also shown was a miniature portable electric drill weighing 4 oz and operating at 6000 rpm under load. It can be used for drills from 0.003 to 0.040 in.

• **A new 90° attachment** for use on the 1-hp milling and boring head was featured by Bridgeport Machines, Inc. The unit may be used for milling, drilling, boring, reaming, cutting gears, hobs and broaches, sawing and slitting, and is particularly valuable for working on inside surfaces.

Introduced by Airborne Accessories was the Dupliform form grinder which incorporates the tracer and diamond dresser in a dovetail slide which can be removed and placed on a magnetic chuck, so the tracer can be dressed to the same height as the diamond. The templet or master part is clamped in a rotatable holder so the form dressed on the wheel is either a direct reproduction or is given relief, as is needed for form tools.

• **Form grinding of die sections** was demonstrated by Moore Special Tool Co., Inc., on the new No. 2 jig grinder, which features an angular and indexing device built into the main spindle, and a new slot grinding attachment. Speeds are variable from 12,000 to 60,000 rpm, and the machine has a larger table size and height, and more power.

Kaufman Mfg. Co. showed high-duty, single- and multiple-spindle tapping machines and a new shuttle-type fixture for tapping tubular parts which can be fed from a magazine. Henry P. Boggis & Co. demonstrated a small abrasive cutoff machine for toolroom use, and Modern Industrial Engineering Co. had a new Burr-Master machine for gear burring and chamfering.

Mueller Engineering Co. demonstrated a new 100-ton hydraulic press which punches holes ⅞ in. in dia through 1¼ in. of steel without noise or shock.

Small Tools

Cutting tools and toolholders were well represented. Scully-Jones & Co. showed a new floating holder that provides unrestricted parallel float through 360° and thus virtually eliminates bell-mouthing of holes. Float is obtained by a system of internal gears, and it is possible to tap a class 3 thread in work 0.015 in. out of alignment with the spindle.

A fully automatic drill chuck which permits instant changing of tools without stopping the spindle was shown by Wahlstrom Tool Div., American Machine & Foundry Co. No keys, collets or wrenches are required, and tools are automatically centered.

Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., exhibited a completely new line of planer tools and accessories. These feature an adjustable backup plate for the toolbit to maintain support over the complete width of the tip, instead of the conventional single-point support.

• **A simple spring-making unit** for use on a drillpress was shown by Cycloid Corp. Goddard & Goddard demonstrated Serratip cutters using solid carbide blades. The tips are brazed to a thin, serrated backing strip in such a manner that only the carbide is touched by the wheel during regrinding, at least for a number of regrinds.

Putnam Tool Co. showed a new positive lock on cutter bodies, instead of a taper shank. The straight tool shank has a partial circumferential slot into which a pin engages to form a bayonet lock. The same company also had an adapter that permits the use of small end mills in arbors, up to No. 50.

Carboloy Co. showed a full line of carbide tools and tips, together with a large variety of shapes not previously considered feasible on the basis of economy. Among these were wear-resistant parts and embossing dies carrying minute, but extremely sharp, details.

• **A deep-hole drilling tool** for automatics was shown by Boyar-Schultz

Corp. This employs an oscillating action which breaks up the chip into small particles and makes it unnecessary to withdraw the drill to get rid of the usual long, stringy chips formed in conventional drilling.

Zagar Tool Co. exhibited its jig-driller system of production drilling whereby a gearless drill head is mounted on top of a 4-post jig and driven by a motor. Work is carried on the lower platen of the jig and is raised to the drills by pulling down the operating handle. Standard gearless heads, collet holding and indexing fixtures, and keyway broaches were also on display.

Ettco-Emrick demonstrated its adjustable-spindle, multiple tapping heads and a new electric indexing unit which provides a positive lock at each position and incorporates a switch for automatic feed of the drillpress at each index.

• **Magnetic perforating dies** were featured by S. B. Whistler & Sons. These consist of punch and die parts mounted on permanent magnets capable of being attached to a templet in any desired arrangement. The units may be removed from the plate and used repeatedly for any number of jobs, and setup consists merely of rearranging them on a new jig-bored templet.

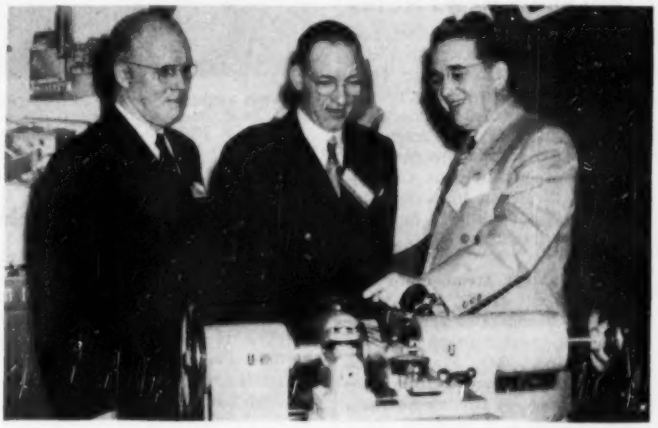
Hannifin Corp. showed a line of foot- and hand-operated valves for air control, and an air-operated small press rated at ½ ton. Completely new in the Hannifin line was a 1-ton hydraulic press operated by a 1½-hp motor and 3.3-gpm pump.

Press feed mechanisms were shown by H. E. Dickerman Mfg. Co. Designed particularly for feeding extremely light stock, the Dickerman hitch feed is intended for automatic feeding of materials commonly employed in the electrical and electronics industries. Heavy-duty rack and pinion roll feeds were shown by F. J. Littell Machine Co.

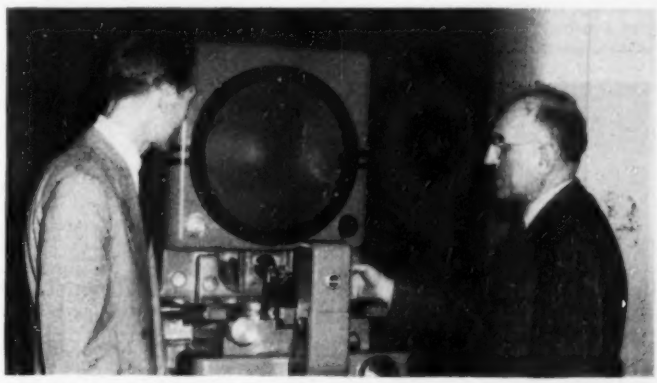
Miscellaneous Equipment

Spray painting by superheated steam represents a radically new development in this field. Advantages claimed are lower finishing costs, reduced overspray, and rapid drying. Designed specifically for this purpose by Livingstone Engineering Co. is a new Speedylectric steam generator, completely self contained. It is self regulated, maintaining electric power input in exact balance with steam output.

J. T. Welch, machine tool sales mgr., left, John Bernard, executive vice president, center, and C. H. Reynolds, vice president, Sheffield Corp.



Walter S. Praeg, president, National Broach & Machine Co., right, points out the merits of a gear checker to J. A. Bingham, master mechanic, Gratiot body plant, Hudson Motor Car Co., center, and V. H. Chrisholm of Hudson Motor



W. G. Norton, sales dept., left, and Louis D. Martin, gear engineer, Eastman Kodak Co., operate one of the Kodak optical comparators

Sundstrand Machine Tool Co. announced a magnetic coolant separator in which a steel disk, containing alnico magnets, revolves against the flow of coolant and picks up the magnetic particles carried in the coolant stream. Separated materials are removed by scrapers and deposited in receptacles.

Sunnen Products Co. introduced its new external honing tool designed to replace lapping on round and straight parts of any metal. The tool is extremely simple to use and is provided with micrometer stone feed. Four sizes are available, covering diameters from 0.120 to 2.750 in.

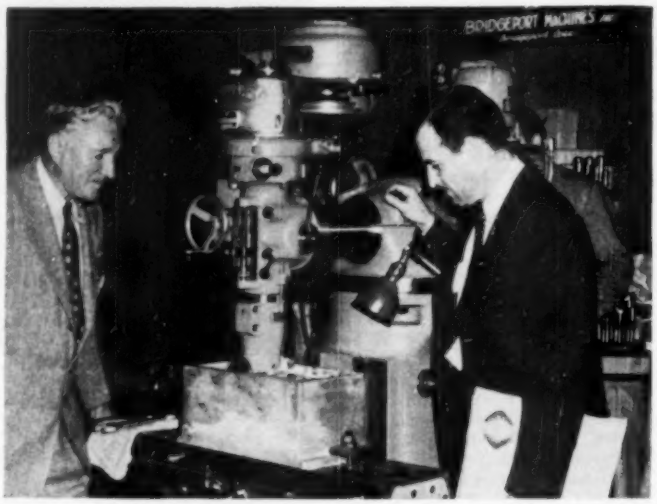
Tool Show News Notes

• **New York City** was selected as the site for the next annual convention of ASTE, in March, 1951. The next industrial exposition to be held is scheduled for the week of March 17, 1952, in Chicago.

• **A $25,000 scholarship fund** offered by an anonymous Chicago concern to permit increased tool engineer scholarships in the state of Illinois was accepted by ASTE directors.

• **An honorary membership** was awarded by ASTE to Senator Ralph E. Flanders of Vermont for "life-time contributions to tool engineering." Sen. Flanders has been an ASTE member for a number of years. A life membership was awarded to E. W. Ernst, chairman of the ASTE Handbook Committee, for his contributions to the compiling and publication of the first Handbook devoted to the profession.

J. C. Hebert, general sales mgr., Jones & Lamson Machine Co., appears to have some doubts about the photographer's ability



Looking mighty pleased with the performance of his new right-angle attachment, R. F. Bannow, president, Bridgeport Machines Co., left, demonstrates its use to L. S. Bettison, president, Chambers Bros.

Some Tool Show Technical Paper Highlights

• **Recent die-casting advances** have made it possible to hold closer tolerances than in the past. Holes can be "cast into" die-cast parts to a size equal to that of drilled and reamed holes. Holes as small as .028 in. dia and 5/64 in. deep have been cast successfully in thousands of parts. Small tapered holes almost 3 in. deep can also be produced with relative ease.—*Charles Franklin, Rochester Products Div., General Motors Corp., Rochester, N. Y.*

• **Striking cost-cutting** possibilities are offered in use of automatic machines to assemble parts instead of using manual labor. Parts can be first automatically formed in presses and then assembled with other parts fed into machines by transfer devices, hoppers, etc. The raw material, such as strip steel, can be fed automatically into one side of a press and the assembled unit comes out the other side, as many as 12 or 15 operations having been performed in between.—*Herman Zorn, president, V & O Press Co., Hudson, N. Y.*

• **Chrome-plating** is being used extensively to reduce cost and increase life. Some performance achievements: 45,000 bushings produced with a chrome plated punch as against 6000 before plating; 1000% increase in life of taps used to thread holes in abrasive non-ferrous materials; 17-fold increase in output of extruding dies following plating with hard chrome to a thickness of only .0005 in.; ability to use steel drills at same speeds as carbide drills with 5 to 8 times life of ordinary steel drills.—*B. A. Taylor, vice president, Chrome Electro-Forming Co., Detroit.*

• **Manufacturing time and cost** are being cut considerably on all kinds of products through broaching. Rifling of gun barrels, for instance, has been cut from over ½ hr per barrel to only 28 sec. In producing T-shaped holes in forgings, requiring removal of 75 lb of metal in form of chips, time was cut from 65 manhours to 20 min.—*O. W. Bonnafe, chief research engineer, LaPointe Machine Tool Co., Hudson, Mass.*

Full Day's Work for Full Day's Pay Demanded at Management Meeting

NEW YORK—"Unless management retains the right to use to the utmost new equipment, new methods, and new techniques, our entire economy will become stagnant and the American standard of living will gradually seek an ever lower level," declared H. H. Whitmore, treasurer & general manager, Jones & Lamson Machine Co., in an address before the 5th annual Time Study and Methods Conference held here April 20-21, sponsored by the Society for Advancement of Management and the Management Div., ASME.

Pointing out that management must have the right to change the standards when methods and equipment are changed, Mr. Whitmore said, "I have seen many instances where new and improved equipment has been purchased at a considerable cost with no return on the investment because management has not insisted that the equipment be used to the utmost within the scope of a predetermined day's work for the individual."

The purchase of new equipment requires a thorough analysis of all the factors of cost and of future business conditions, according to M. F. Macaulay, manager of manufacturing control, Packard Motor Car Co., who discussed man-machine assignments. Mr. Macaulay cautioned that direct savings in manpower often do not give the complete story; that management must arrive at the optimum utilization of capital investment as well as the optimum utilization of labor in determining the economical cost of the product.

Several speakers emphasized the need for controlling indirect labor costs. C. A. Woodley, assistant general factory manager, Caterpillar Tractor Co., advised management to adopt a "questioning attitude" toward the need for indirect work, stating, "It is too easy when bottlenecks develop . . . to hire additional people, overlooking completely the possibilities of new equipment, change of methods or a full day's work from the people doing the job."

Powder Metal Parts Exhibited

DETROIT—On display at the Metal Powder Show here April 25-26, sponsored by the Metal Powder Assn., were examples of self-lubricating bearings, clutch facings, brake linings, a myriad of pressed parts like gears and lock mechanisms, and samples of toy electric train car wheels with powders, press, and sintering furnace which were used in making the wheels.

A. J. Langhammer, president of Amplex Mfg. Co., Chrysler Corp. subsidiary, told the Association members that in the field of powder metallurgy as in any other field, "good cost accounting and proper evaluation of the forward picture is a basic fundamental of sound business. Upon it lies the success or failure of anyone making products for sale to the public."

John Sasso, industrial production editor of *Business Week*, speaking on "Metal Powders in a Competitive Market," said that the most common statement heard in the field is that powder metal fabricators and metal powder people are too secretive. He warned that, "If you don't have interchange of information, you stagnate, you duplicate expensive work, you miss out on the little ideas that make all the difference between a success and failure in a particular part."

FRED H. CHAPIN, chairman and president, National Acme Co., Cleveland, shows congratulatory telegrams sent him on his 75th birthday anniversary, April 11

McGraw-Hill
WORLD NEWS Notes

• **Machinery** worth $933,800,000 has gone to ECA nations in first two Marshall Plan years. France received lion's share—$264,900,000. Italy received $169,900,000, United Kingdom $159,700,000 of total share. ECA is also boosting exports of agricultural machinery.

• **Hiller helicopter** sales in dollar-short Britain are encouraged by an agreement whereby the manufacturer, United Helicopters Inc., Palo Alto, Calif., will accept 40% of the purchase price in sterling, provided sales are sufficient for their British agent (C. Colin Cooper, London) to order ten or more 'copters.

• **The 32nd International Auto Show**—one of Italy's biggest commercial exhibitions—will be held May 4-14 in Turin. Seven nations will be represented: Belgium, France, Germany, Great Britain, Italy, Switzerland, and the U.S.

• **Machine tools** and other items taken from dismantled German factories realized in Australia the sum of £835,368 (about $1,870,000) up to the end of February. Sales were made by tender and public auction.

• **Australian manufacturers** will spend an estimated £44.5 million for capital equipment in first half of 1950, and £35.6 million in the second half, exclusive of expenditures for new buildings.

• **Technical cooperation** agreement covering 12-year period signed between Finsider of Italy and Armco Steel Corp., Middletown, Ohio, is aimed at bringing up to date the Italian steel and iron industry. Armco will supply Finsider with 60 experts and specialized workers who will train the Finsider staff in modern American methods. A like number of Finsider men will work in Armco factories here.

• **A hot-cold strip mill** and tinplate plant is being erected at Port Kembla, New South Wales, by Broken Hill Proprietary Co., Ltd. It will include two new batteries of coke ovens, a third blast furnace, two additional open-hearth furnaces and major alterations and additions to an existing steel-making plant.

• **A "job-site maintenance"** shop truck, embodying many new features proposed by Army Engineer Research and Development Laboratories, has been produced commercially. The new highly mobile repair shop consists of a ¾-ton, 4x4 truck with a utilities type body, take-off driven welding and power generator and oxyacetylene cutting and welding equipment.

• **Metal Powder Assn.** has released M.P.A. Standard 8-50T, "Tentative Method for Acceptance Tests on Structural Parts Made from Metal Powders," describing procedures for testing a variety of pressed and sintered parts made from metal powders.

• **Commonwealth Aircraft Corp.** of Australia, now building 5000-lb thrust Rolls Royce Nene turbojet engines, may soon change over to more advanced Rolls Royce model, the Avon multistage axial compressor jet. The Tay jet may be considered as an alternative. The Avons would be used to power the Canberra bomber, also to be built in Australia, and an Australian-designed twin-seat fighter.

• **American Standards Assn.** has approved two new and two revised American standards for machine tools covering punch and die sets for two-post, punch press tools; involute serrations; single-point tools and tool posts; and twist drills, straight shank and taper shank. ASME is publishing the standards.

• **The Marform Process** of Glenn L. Martin Co., Baltimore, will be introduced into Europe and other export territories by Loewy Engineering Co., Ltd., London. Loewy will build presses in its works at Light Machines Ltd., Yeovil.

A.M. Wins Safety Award

AMERICAN MACHINIST has been voted the National Safety Council's Public Interest Award for 1949.

In a letter accompanying the announcement, Ned H. Dearborn, Council president, stated: "We are very proud to confer this public recognition for exceptional service to safety, and are extremely grateful to you. There is no doubt your efforts have helped prevent many accidents and saved lives."

Distributors Hear ECA Nations Will Buy $65 Million of U.S. Machine Tools

CHICAGO—ECA countries probably will buy some $65 million of U.S. machine tools during fiscal year 1951.

• **Machine tools sold** on government contracts are not subject to renegotiation unless they are part of the end product, such as being part of machine shop equipment on board a warship.

• **Progress is being made** toward educating machine tool users to need for intelligent, steady replacement policy whereby old machines are retired in favor of new.

These were some of facts coming out of 26th spring meeting of American Machine Tool Distributors' Association at Edgewater Beach Hotel April 13-14. O. W. Johaning, Colcord-Wright Machinery & Supply Co., St. Louis, who is president of the association, presided at all sessions.

Benefits of a small pension plan combined with a profit-sharing trust for employees of distributors' organizations were outlined in detail by F. B. Scott, president Syracuse Supply Co., Syracuse, N. Y. Mr. Scott emphasized that "a profit-sharing trust can be drawn to give some cash relief, if a real emergency arises, and stil retain its tax-free status which is important."

Such a trust has these effects:

1. It is strong incentive to all employees, as payments into trust are out of profits after earnings reach specified amount. No earnings, no trust.

2. It is substantial health and life insurance plan because trust is available in case of sickness or death.

3. It reduces labor turnover among salesmen and executives.

4. Funds may be borrowed from it with proper collateral in lean year.

5. Entire amount for each employee may be passed on at death without tax, if estate is less than $60,000.

6. Funds can be treated as long-term capital gain at tax rate of only 25%.

O. W. JOHANING, president of Colcord-Wright Machinery & Supply Co., St. Louis, and head of American Machine Tool Distributors' Association, who presided at all sessions

• **Sales refresher courses** of one-week's duration each will be held this summer at Cornell and Purdue universities, Tell Berna, general manager National Machine Tool Builders' Association, said. These courses will be sponsored, as they have been the last two years, by the builders' and distributors' associations. Only a small portion of the industry's total sales force of 3400 men have thus far taken these courses.

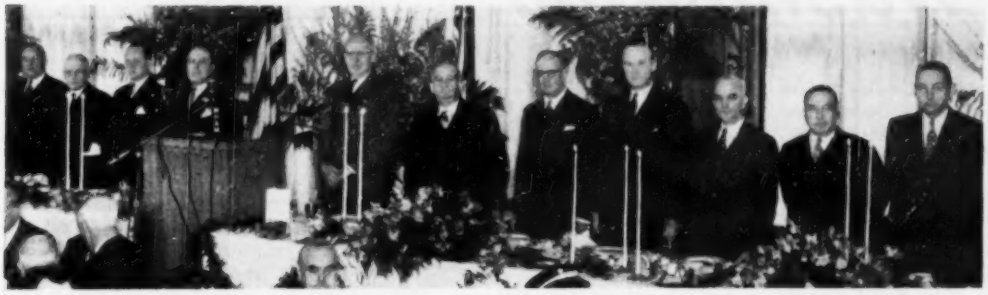
Mr. Berna outlined some of the difficulties which the machine tool builders have in doing business abroad and told of the efforts to get legislation and regulations in Washington which put less of a handicap on purchasers of new machinery. He predicted that Congress will not take action on a more liberal depreciation tax law at this session.

Every distributor and all his salesmen should make use of the "Replacement Manual" issued by Machinery & Allied Products Institute and of the booklet "Computing Return on Invested Capital," Mr. Berna urged. Progress is being made in getting machine users to consider replacement of obsolete machines by new, cost-cutting units.

• **Best hope of expanding** machine tool sales is to increase the amount of "replacement business," Burnham Finney, editor, AMERICAN MACHINIST, told the members. The replacement market is tremendous, he said, citing figures revealed by AMERICAN MACHINIST's Mid-Century Inventory of Metalworking Equipment. Example: number of machine tools installed in U. S. metalworking industries is equal to all machine tools installed in automobile, aircraft, electrical products and farm implement industries combined.

Fall meeting of the association will be held at Lake Placid, N. Y., September 29-30.

Industrialists Gather to Mark 85th Gleason Year



24 KEY MEN occupied speaker's table at luncheon marking 85th anniversary of Gleason Works. Here is the center group, left to right: M. Herbert Eisenhart, chairman, Bausch & Lomb Optical Co.; James E. Gleason, chairman, Gleason Works; William J. Kelly, president, MAPI; E. Blakeney Gleason, president and treasurer, Gleason Works; Tell Berna, general manager, NMTBA; Samuel B. Dicker, mayor of Rochester; Thomas J. Hargrave, president, Eastman Kodak; Rev. Harold E. Nicely; Arthur L. Stewart, vice president, chief engineer and director, Gleason Works; Russell D. Morrill, and Dwight VandeVate, Gleason works manager.

ROCHESTER—Gleason Works celebrated its 85th anniversary here with a luncheon for 600 people and an evening open house for employees and their families and friends, April 8.

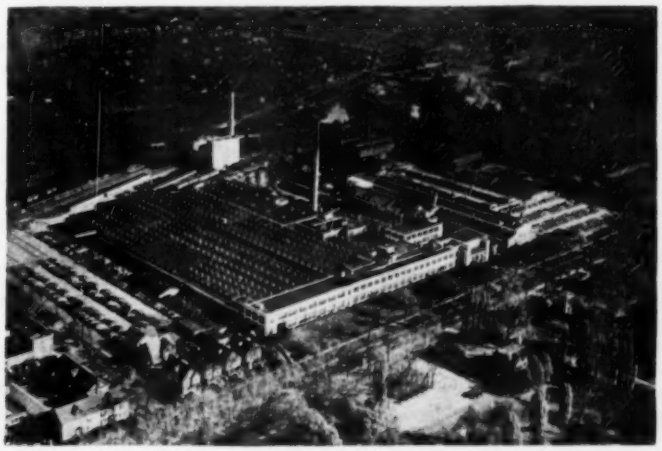
Luncheon guests heard Tell Berna explain how the "machine-tool industry develops by demands of its customers" for new and higher-capacity equipment. William J. Kelly, president, MAPI, presented a look ahead and a program for tomorrow that offered a stirring challenge.

Forty employees with 35 years or more of Gleason experience were presented with testimonial watches.

Some 5000 people went through the plant during the 3-hour open house.

EACH DIVISION had its own displays; this one shows spiral cutters

85 YEARS AGO William Gleason had this plant at Brown's Race



NOW the company has the present 500,000-sq ft plant on University Ave. in Rochester, occupying nearly 24 acres

Washington

Think twice before cutting a work week after a union election. NLRB may rule you did it in reprisal. That happened in the Westinghouse Pacific Coast Brake Co. case, where the company cut the work week from 45 to 40 hours right after the International Assn. of Machinists won a close election, 21-to-18. The company is now liable for lost wages.

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New Social Security law won't revolutionize government pensions. But it will include more people, such as self-employed, some processors and the like. Pension payments will be hiked to meet higher living costs. The $3,000 taxable ceiling may be raised to $3,600, but the 1.5% rate will stay put for now.

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No big guns—5-in. 50-cal. and the like—for merchant ships in another war. That's the decision of Navy strategists who figure smaller high-speed anti-aircraft weapons will be enough.

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You can fire employees who violate the 60-day-strike-notice rule of Taft-Hartley. National Labor Relations Board ruled that way when it upheld Ohio Oil Co's. refusal to take back workers who struck on the 59th day.

But a union may strike anytime it wishes after expiration of the 60-day period—if its contract doesn't contain a no-strike clause. NLRB ruled that way in the Wilson & Co. case.

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Passage of the $4-billion housing bill puts a boom floor under construction for another two years. Wording of the new bill will channel more money into lower cost houses and apartments.

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Commerce Secretary Sawyer's defense of big business sounds good, but there's a lot of politics in it. It's part of the administration's plan to win business support next fall, like the Brannan plan for farmers, Taft-Hartley repealer for labor. However, Mr. Sawyer actually believes some of the things he's saying.

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Are union-inspired consumer boycotts legal? You may find out when NLRB rules on union demands that the Hoover Co. re-instate 12 discharged union leaders. During the 1948 strike the then-CIO electrical union organized a nationwide consumer boycott of Hoover products.

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The $25-million needed to repair ships in the reserve merchant fleet stands a 50-50 chance of being appropriated this year. It will take a letter from Truman, though, to get it through Rep. Cannon's House Appropriations Committee. Shipyards are counting on the business to stay alive.

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Tariff cutting talks this fall may mean trouble for U.S. metalworking. With Germany included as a negotiating country for the first time, some 800 metals and metal products are scheduled for possible lower import duties. You can have your day in court though. Notify Tariff Commission's Committee for Reciprocity Information of your objections before May 10. File a brief before May 17, and you'll get a hearing.

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Russia's token shipment of chrome and manganese in February doesn't mean anything. It was just a teaser to see if the U.S. would loosen up exports of machine tools and you saw the answer in tightening up of export controls.

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Royalties on inventions will be taxed as income—not capital gains. Bureau of Internal Revenue now chooses to flaunt a court decision to the contrary. Fear in industry is that inventors will pass the higher tax cost along as demands for higher royalties.

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Patent Office's application backlog is dwindling. The June 1948 peak of 244,000 pending requests is down to 220,000 and still falling. It still takes five years to act on a patent, but patent office chiefs are confident they'll cut that down too.

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You can pay a "learner" 55 cents an hour under minimum wage laws, but you'd better know the rules. No more than 10% of your workers can be learners. Custodial, unskilled maintenance, office and clerical workers don't qualify. Lower rates don't apply to piece-work. No wage can undercut state laws, Walsh-Healey Act, or union contracts. Lower rates apply only to the first 480 hours worked. And, you must have a permit from Labor Dept's. Wage-Hour Division.

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How to make it easier to win triple damage suits is one of the next things Rep. E. Celler's (D., N.Y.) monopoly subcommittee will take up. Two suggestions would (1) let the government sue for damages (but not triple damages); (2) make a government antitrust verdict "conclusive" proof of an anti-trust violation in a private suit. Now it's "prima facie" evidence.

Detroit

Major retooling programs: Plenty is being talked about on engines, but few programs exist in reality. Ford has given some machine tool orders for its new Cleveland engine plant; expectations are that a new powerplant will be built for 1952 models. Chrysler has designs well along. All is quiet in the GM sector.

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On body dies, Fisher has released a fair quantity of work for 1951 models. Chrysler has passed out some, and so has Nash. A little work has come out of Buick and Packard also.

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The 1951 Packard will quite definitely be "hot," according to Detroit rumors. There is even more agreement that the company, with sales in the doldrums of late, definitely needs a stiff shot in the arm. Most of the Packard die program, it appears, is being handled by Briggs.

Advertising which will appear shortly states that Packard expects to spend $18,996,000 for plant, machinery, and tools this year. In 1949 the equipping bill was $7,984,095. The large share of this current year's expenditure is for 1951 models dies.

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"Colossal" is the only word for auto production and sales. Producer after producer reports record-shattering retail volume during March and April. Output, meanwhile, mounted at mid-April to around 140,000 cars and trucks a week. That was without anything from strike-bound Chrysler plants. With them, volume would soar to 175,000 or more—completely unprecedented. Orders at many dealerships are moving steadily ahead of factory shipments.

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The heavy truck makers, in the doldrums for almost two years, are also perking up. Good business at hand and ahead, huge construction, increasing truck shipments are combining to bolster business and prospects in the heavy hauling field.

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Longterm outlook: Demand for new cars and trucks should remain very high through 1955, with automotive installment credit creeping higher all the time. Output this year should at least equal and probably will exceed the 1949 totals —as indicated by current car registrations running nearly 25% above a year ago. The forecaster: George Romney, Vice President of Nash-Kelvinator Corp.

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Lower car prices: They are inevitable when competition gets tighter. Best current examples are the reduced tags on Frazer and Willys lines. Frazer cut its factory delivered price on sedans to $2,359 from $2,395, on 1949 models. Willys reduced a number of prices, from $40 on the 6-cylinder jeepster to $120 on the 6-cylinder station wagon. The jeep itself, however, stays at $1,195 factory list. If the excise tax is removed—a possibility—all cars will go down $100 or more.

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Detroit employment expectations, April from March, are up. A spring peak would have been realized this month had it not been for the Chrysler strike. Even without any resumption at Chrysler, payrolls can be expected to advance modestly through the month.

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Meanwhile efforts to settle the Chrysler strike, which went into its third month with the start of April, were joined by another highly significant negotiation—that between the C.I.O. United Auto Workers and General Motors Corp. No conclusions are expected in that latter set of meetings before late May—the contract runs out May 29.

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Military work is growing. Contracts awarded by the Detroit Ordnance District to automotive companies in the 1950 fiscal year total $161,301,000. By the end of the year, June 30, they are expected to surpass the $184,930,000 of the 1949 fiscal year. More than 8,000 companies are bidding for work, the competition resulting in gradually lower contract prices.

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What's happening to your capital investment per worker? At Goodyear it has gone up 50% during the past decade. Each 1949 Goodyear job represented plant, tool and inventory investment of more than $9,000. This compares with about $6,000 in 1939. Says Goodyear: "Increase reflects higher costs of tool and plant replacement over this period."

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Red faces: Probably some of Detroit's engineers are sporting them. They looked askance at the British Rover announcement of an automotive gas turbine engine, said there were problems of practicality. They had to swallow some of their words, though, when Boeing announced a truck turbine engine undergoing test—apparently with fair success—in a Kenworth truck. Practically all companies have bought experimental turbine sections for lab work—and now they're saying nothing about what's going on.

• **A new electrical laboratory,** so complete it can duplicate for testing purposes the entire electric system of large multi-engined aircraft, has been put into operation by Boeing Airplane Co., Seattle. Actual airplane flight test time, figured in thousands of dollars per flight hour, is cut almost to nothing insofar as electrical proving is concerned.

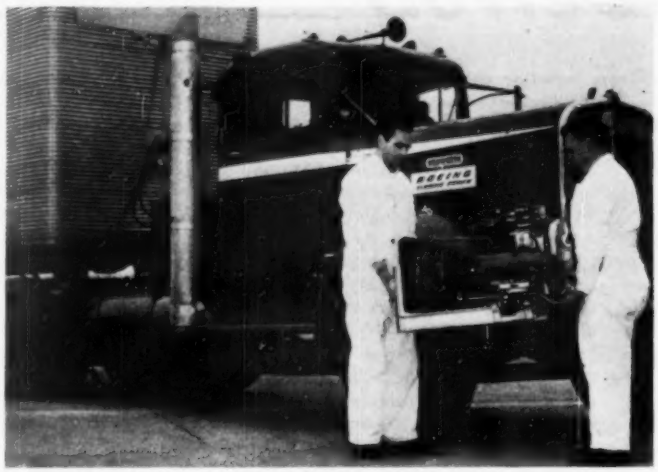
• **Nine small booklets,** the first of 54 comprising a "complete library in miniature for the factory or metalworking plant" have been placed on sale by the Office of Technical Services, Dept. of Commerce. Titles now available, obtainable from OTS: "Machining Aluminum Alloys," "Tapered Workpieces," "Corrosion," "Dust Control in Machine Shops," "Cemented Carbide Cutting Tools," "Lubrication of Machine Tools," "Increased Utilization of Shapers," and "The Oxy-acetylene Torch."

• **The world's largest helicopter,** the XH-17, which engineers say will be capable of lifting a small tank or a piece of heavy artillery, is nearing completion at the Hughes Aircraft Co. in Culver City, Calif. It will be ground-tested this spring.

• **Low-temperature testing** of ball-bearing lubricants is possible with a semi-portable device developed by General Electric. Heart of the device is a cooling chamber in which dry ice is placed. A ball bearing is placed on a spindle in the chamber and rotated by a motor. Tendency of the outer ring of the ball bearing to move with the inner ring is measured by a strain gage. If a lubricant under test thickens in the cold temperature, the inner ring will not turn freely and the gage will register a greater strain on the outer ring.

• **Controlling interest** in Marquardt Aircraft Co., Van Nuys, Calif., has been sold by General Tire & Rubber Co. to a group of investors headed by Laurence S. Rockefeller.

• **A Cincinnati syndicate** has purchased controlling interest in Sidney Machine Tool Co., Sidney, Ohio. Sidney G. Rose and Philip Moskowitz head the syndicate.



200-LB BOEING GAS TURBINE similar to that installed in 10-ton Kenworth truck is easily lifted by two mechanics. The 175-hp turbine weighs some 2500 lb less than conventional engines of equal power, occupies 13% less space

Boeing Tests World's First Gas Turbine Truck

SEATTLE—Preliminary road tests of the world's first gas turbine-powered truck, using an experimental 175 hp lightweight turbine, have exceeded all expectations of Boeing Airplane Co., and Kenworth Motor Truck Corp., builder of the chassis.

The new truck is quieter than conventional diesel, even without mufflers on twin exhausts which rise on each side of cab. Exhaust gases are about same temperature as those from diesel, are virtually invisible, except for a puff at starting, and have no offensive odor.

Two to three times as much fuel is burned, compared with a diesel engine, but the turbine can use heavier, cheaper grades.

The turbine has but 1/5 to 1/10 as many moving parts as a diesel and no sliding parts, so in quantity output production costs should be much less than for piston engines. It can cost several thousand dollars more than a diesel engine, initially, and still be economically feasible for truck operation, because of the anticipated longer life, and because increased payload permitted by an engine 2500 lb lighter can amount to as much as $2500. But fuel consumptio nmust be reduced 30%.

Basically, the Boeing turbine comprises two major sections: the gas producer and the power-output section. The gas producer consists principally of a single-stage centrifugal compressor, two can-type burners and an axial-flow turbine wheel. Gases travel from the first-stage turbine wheel (36,000 rpm) through a nozzle box, and are expanded through the second-stage wheel which drives the output shaft.

This second-stage vaned wheel turns at 22,500 rpm and drives through a 9:1 reduction gear, stepping the rpm down to 2500 and producing a continuous output-shaft rating of 175 hp.

New X-Ray Service

MILWAUKEE—A "packaged" x-ray service — "Maxiservice" — complete with equipment, maintenance, repair parts, tubes and instruction, all covered by one monthly charge, is being offered to industry by General Electric X-Ray Corp.

The monthly charge is 100% chargeable against operating expenses. The basic agreement covering Maxiservice is for a 2-year period, with automatic renewal for each year thereafter unless cancelled by either party. The customer has the option of signing the service agreement and then exercising an option to buy with a 30% credit allowed for monthly service charges paid.

New Tooling

Machine tool orders skyrocketed in March to 107.4 on index of National Machine Tool Builders' Association. That is highest since June, 1946. Many builders report March as best month since end of war.

Even better, March was not just a flash. Improvement in machine tool sales started last November, has been especially strong since turn of year. April is proving to be banner month for machine tool sales, too.

Largest chunk of business is automotive. But farm implement and many other domestic industries have been buying machine tools.

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Foreign orders continue better than one-fifth of total. They should be good for some time despite handicaps of dollar shortages and various import restrictions placed by individual nations.

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Some $64.9 million of ECA funds probably will be allocated for purchase of U.S. machine tools in fiscal 1951, compared with $73.2 million this year. France, with $16.9 million, and Italy, with $15.3 million, will be best markets. United Kingdom will spend $12.8 million here.

Other participants are: Netherlands, $4.3 million; Austria, $3.6; Belgium - Luxembourg, $3; Sweden $2.7; Germany Federal Republic, $2.3; Turkey $1.2; Denmark, $1. Greece, Norway and Trieste are being allotted minor sums for U.S. machinery.

Budd Co. is spending $7 million on its new automobile stamping plant at Gary, Ind., which should be ready for production this fall. Over $4 million of total is going for new stamping presses.

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Press builders have comfortable backlog and incoming business is brisk. As in machine tools, much of volume stems from automotive sources.

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Cutting tool manufacturers say that orders are running considerably ahead of last year. Next few months look good, too.

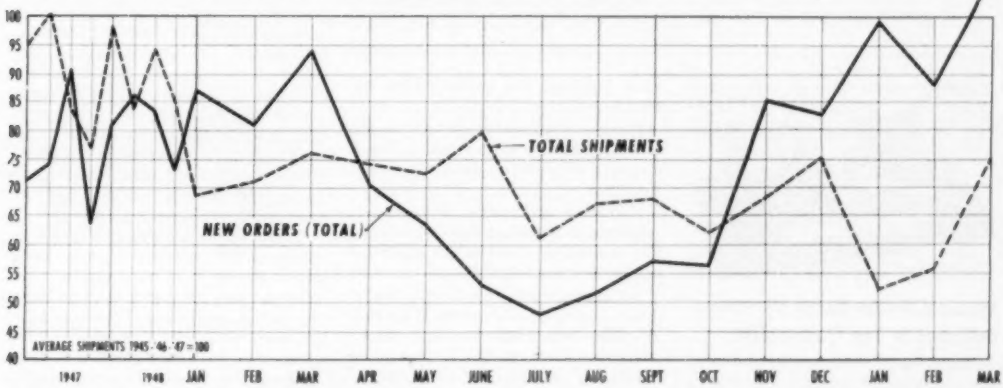
• • •

There has been no release of machine tool orders or of tool and die program for Chrysler for a 1951 engine. Feeling in Detroit is that any new Chrysler engine will first be used in 1952 models. Shortness of time will prevent introduction in '51.

• • •

Machine tool shipments rose sharply in March. April should be at March level or higher, but production is running considerably behind sales. Backlog is equal to five-months' business at current rate. Main trouble: special-purpose machinery builders are overloaded with work, general-purpose builders are not getting proportionate share of increase. Export customers took almost 30% of machines shipped by the industry during March. ECA countries are responsible for 90% of export.

March New Orders for Machine Tools Climb Over the Top →

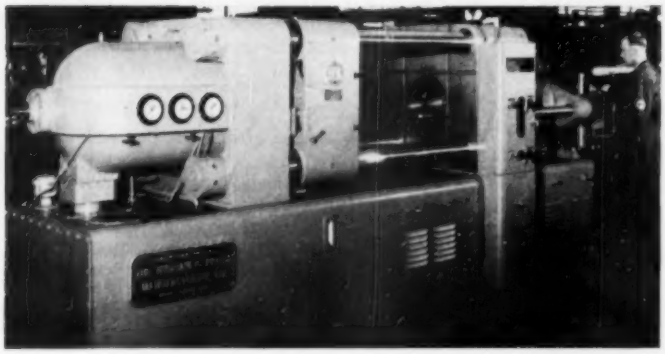


New Orders (Total)	80.9	93.5	70.1	63.7	53.6	48.0	51.5	57.7	56.8	84.3	82.5	99.7	88.7	p107.4
Foreign Orders (Incl. in Total)	26.5	22.3	23.1	15.9	15.7	14.0	18.8	13.7	13.7	17.1	22.4	26.7	18.8	p 23.3
Shipments (Total)	70.3	75.8	74.9	72.8	79.0	60.7	67.3	67.6	62.3	68.0	75.7	52.8	55.8	p 75.4

Data: NMTBA

p—preliminary figures

New Shop Equipment



Hydraulic Press Die Casting Machine Can Handle 125 Shots Per Hour

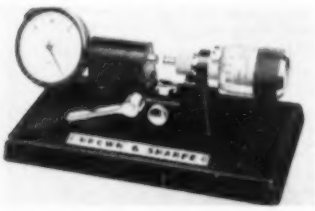
Model 400-M is a self-contained, all-hydraulic die casting machine for producing castings in magnesium, aluminum, or copper-base alloys. The die clamping pressure is 400 tons, and maximum production is 125 shots per hour.

Designed for cold chamber injection, the machine is said to produce castings that are relatively free of porosity because of the high sustained injection pressure. Injection speed is governed by controlling the rate of discharge of oil ahead of the injection piston. Piston return is hydraulic.

Closing and sealing of the die halves is handled by a double-action hydraulic ram. A booster ram provides fast closing of the clamp platen to within a fraction of an inch of the total clamp stroke. Both die opening and closing are said to be free from shock.

Die openings are controlled through electric timers. There is automatic control of die movement, clamping, and injection plunger movement. Ejection of the finished casting is automatic with a separate hydraulic cylinder being provided for this purpose.

Hydraulic Press Manufacturing Co., Mount Gilead, Ohio



Brown & Sharpe Bench Micrometer Indicates to Ten Thousandths

A micrometer and a dial indicator are combined in the No. 245 Indicating Bench Micrometer. With a capacity from 0 to ½ in., it can be used in three ways:

1. As a micrometer, with measurement through the entire range by 0.0001 in.

2. As a comparator, it can be set without additional standards. Readings to 0.0001 in. are taken from the dial gage.

3. As an indicating micrometer, readings to 0.0001 in. are taken from the dial gage with the micrometer set to the nearest 0.001 in.

Measuring pressure is adjustable from 8 oz to 2 lb to meet the needs of wire manufacturers and others requiring standardized measurements at predetermined pressures. Pressure can be set to measure resilient materials as well as metals.

Brown & Sharpe Mfg. Co., Providence 1, Rhode Island

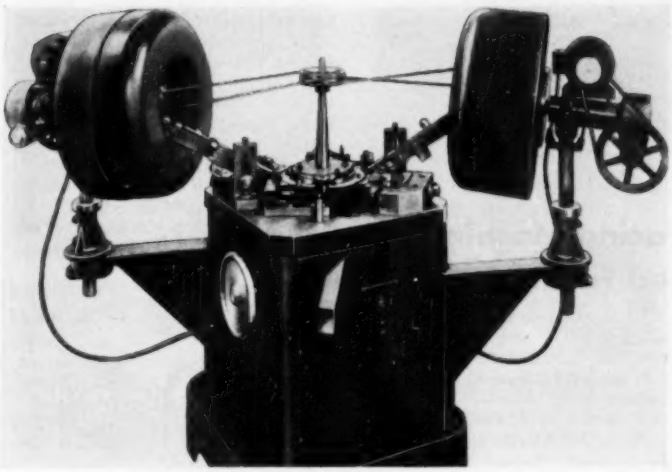
Drilling-, Tapping-Machine Speeds Controlled With One Lever

A single lever controls speed changes, and a single dial operates feed changes on the Barnesdril 201¼ standard high-production drilling machine. An automatic depth control trips out feed at a predetermined position, for drilling operations, or trips an electric reverse for tapping. On regular drilling operations the spindle continues to rotate and is returned to starting position by handwheel or automatically with coil-spring attachment. On tapping operations with thread-leading feed attachment, the feed remains engaged and the rotation is tripped to forward at the upper position.

These machines are produced in single-spindle models or with gang drills. Swing is 20 in., distance from column to spindle center is 10¼ in. and max distance from spindle to table is 33½ in. Capacity in SAE 1035 steel is 1¼ in. Units are powered by 3-hp motor. Standard speeds are 95 to 943 rpm; special speeds 47 to 471 or 142 to 1415 rpm.

Barnes Drill Co., Chestnut St., Rockford, Ill.

Materials and Parts



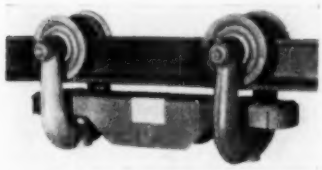
Prutton Rotary Thread Roller Produces Threads to ¼ in. Dia

Model 120 Rollmaster thread roller will roll lengths up to 2⅛ in. on diameters up to ¼ in. Production rate with two feeds is 25,000 per hour, the same as for the smaller Model 100 previously introduced. The machine is said to hold a consistent thread tolerance of Class 3, or better.

It is a two-station rotary machine with independent operation of either station possible. Two different head types and thread lengths can be run simultaneously without mixing.

The Adjustomatic feeding device, which is available separately, will feed 15,000 ¼-in. bolts per hour. It is adjustable for height, angle, speed, and spill. The feeding barrel is available in various sizes to cover the range of small parts within the capacity of the thread roller.

D. H. Prutton Machinery & Tool Co., 5295 W. 150th St., Cleveland, Ohio



Dead Weight, Roller Friction Reduced on Tramrail Trolley

Chilled cast-iron wheels of 4½-in. thread dia, rolling on high-carbon, high-manganese steel rails, are said to reduce friction losses to a minimum on this tramrail trolley. Modified-tube cross-section design for the trolley yoke, using two steel stampings welded back to back, produces a high strength to weight ratio. Channel-shaped rolled-steel plate bars produce further weight reduction. Trolley yoke swivels freely on the king pin eliminating binding of wheel flanges on curves and switches of short radius. Flexibility of load-bar design permits four-wheel trolleys with length up to 36 in. for a chain, air-operated, or electric hoists. Heavier loads can be handled by eight-wheel trolley units with yokes on centers ranging from 8-8-8 in. to 16-40-16 in.

The Forker Corp., 2024 Random Road, Cleveland 6, Ohio

...INCLUDING

Wheelheads for internal grinding have speeds from 6000 to 100,000 rpm. .....page 132

Coupling has improved rubber and bonding to handle torque 20% higher than before.....page 134

Zinc die caster uses fast chill and high cycle speed for production to 700 shots per hour....page 136

Torque wrench is set by micrometer adjustment to desired value .....page 138

Hard chrome on ejector toolholder cuts down chip erosion, is said to give up to five times previous life .....page 140

Universal internal grinder, for toolroom or production, has infinite speeds in range from 40 to 350 rpm.....page 142

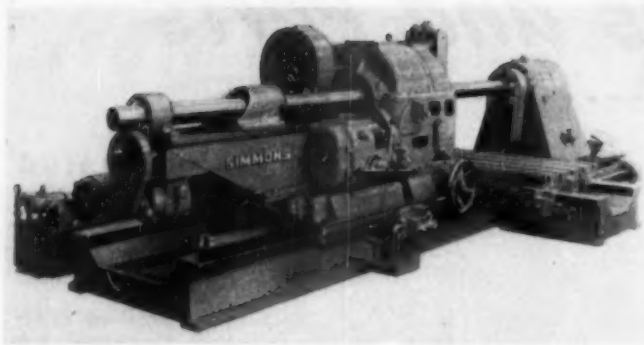
Carbide drills which cut metal up to 66 R_c are made in six sizes from ⅛ to ½ in.....page 144

... and in May 15

Mechanical, double-action press retains actual drawing speed but speeds up non-drawing parts of the cycle to give a gain of 70% in production.

Automatic checking recorder for making chart records of gear teeth now has electric 2-speed drive for improved accuracy.

Openside shapers are being made with longer stroke lengths. New models have strokes of 48, 60, and 72 in.

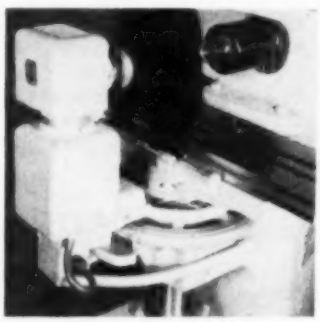


Horizontal Boring, Facing Machine Has Continuous-Speed Facing Head

Both the bar feed in the head and the entire boring and facing unit of this 6-in.-bar horizontal machine moves hydraulically along the bed. Designed to take advantage of carbide tooling, the machine delivers bar speeds between 3 and 150 rpm and bar feeds from 0.0005 to 0.5 in. per rev. Developed for boring large deep holes accurately, the unit is powered by a 40-hp motor with precision anti-friction bearings.

A continuous-feed-facing head eliminates the star feed, formerly used on facing heads, and allows full use of high-speed facing with carbide tools. Standard bar length is 17 ft and the travel in one setting is 60 in. Bed lengths and widths can be supplied to meet requirements. Units are built with both fixed and hydraulic cross tables.

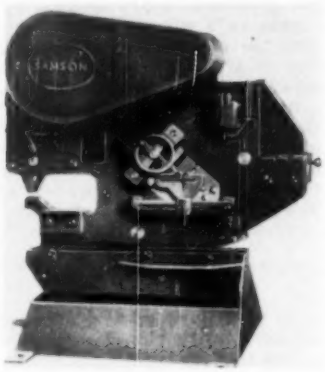
Simmons Machine Tool Corp., Albany, N. Y.



High-Intensity Illuminators Made for Optical Comparators

Providing increased screen illumination, particularly at high magnifications, these illuminators are supplied on all Jones & Lamson Model DC-14, PC-14 and PC-30 optical comparators. They make shadow outline sharper and are said to provide highly accurate readings with less effort and increased eye comfort. The upper portion of the unit carries a 10-v bulb, a condensing lens, and a color filter. The lower section houses a small blower.

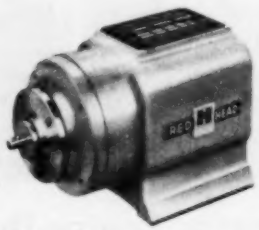
Jones & Lamson Machine Co., Springfield, Vt.



Universal Fabricator Includes Punch, Shear and Bar Cutter

The punch of the Samson No. 10 Universal Fabricator handles webs and flanges of beams, channels, and columns as well as angles and flat stock. The shear cuts plates and sheets of any length or width and trims angles, and the bar cutter handles rounds and squares, angles and tees. Tees can be cut straight or on a miter up to 45°. The machine is also equipped with a coper which notches a 90° V on angles and tees and copes structural shapes and plates. Standard equipment includes two interchangeable die blocks which enables the punch to handle a wider range of shapes, a one-shot centralized lubrication system and a complete set of guards. A swing-away punch stripper, a quick-adjustable bar cutter, stripper, and shear hold-down, and rollers imbedded in shear table, are built into this machine. The unit is available in three models with 12-, 15-, and 20-in. depths of throat, and corresponding 8-, 10-, and 10½- in. shear knives. The smaller unit provides 35 strokes per min, and the two larger ones, 30 strokes per min.

Julius Blum & Co., Inc., 532-540 W. 22nd St., New York 11, N. Y.



High-Speed Wheelhead For Small-Hole Grinding

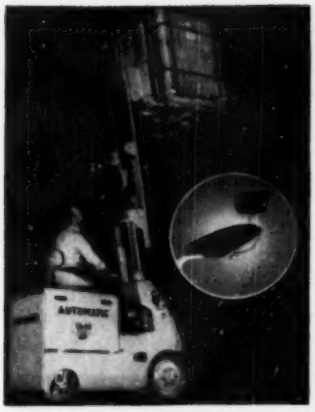
Heald Red Head high frequency wheelheads for internal grinding are available in eight different models covering a range from 6000 to 100,000 rpm. The two smaller size heads have a combined range of 45,000-100,000 rpm and are arranged to take mounted point wheels. The higher speed units are designed to fill requirements in high-speed small-hole grinding, beyond the practical limits of conventional belt-driven heads.

The Heald Machine Company, Worcester, Massachusetts

Lubrication System Improved On Bliss Inclinable Presses

Oil-impregnated bearing on the rolling-key clutch of Bliss inclinable presses needs to be oiled only after each 40-hr operation. These bearings retain the oil within their porous structure which, after reaching operating temperature, causes the oil to expand and completely lubricate the working surface of the clutch. Bearings have an outer peripheral groove which serves as a reservoir. Neoprene seals are not required with these bearings.

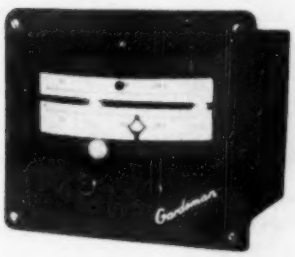
E. W. Bliss Co., Toledo, Ohio



Electrical Controls Combined, Enclosed, in Redesigned Lift Truck

Design changes in 12 models of the automatic sit-down Skylift (BF) electrical industrial trucks are said to provide longer life, greater operator comfort, reduced maintenance, and superior performance. A 2-in. lift increase has been added, with no change in the 85-in. collapsible mast height. Trucks now tier to 132 in. All electrical controls have been combined in a completely enclosed panel on the dashboard. The entire control panel is now removable as a unit. A larger seat, with foam rubber padding and adjustable back rest, offers more comfort to the operator.

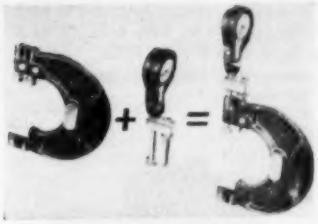
Automatic Transportation Co., 149 W. 87th St., Chicago, Ill.



Pyrometric Controller Operates On Electronic Principles

The Gardsman Controller (Model J) operates on electronic principles without any physical contact to the movement pointed. It uses no filament tubes, thus insuring longer uninterrupted service. A minute electric current, generated by a thermocouple in the furnace, swings the meter pointer to a point on the scale corresponding to the furnace temperature. When the furnace temperature reaches the desired point, a relay system of the controller shuts off the fuel or current supply to the furnace. A similar arrangement turns fuel or power supply on when the temperature drops below specification. The unit is powered by either 115 or 230-v ac supply.

Taco West Corp., 525 N. Noble St., Chicago 22, Ill.



Device Converts Snap Gages Into Dial Instruments

The Dializer is a device which converts American Gage Design adjustable-limit snap gages into dial instruments. It is inserted in place of two gaging pins and is adjusted by means of a knurled nut. It may be clamped in final position by the same locking mechanism used originally for one of the gaging pins. Range of the limit gage is not changed. The dializer is available for frames No. 1 through No. 6 and will go in any model A, B, or C. It can be furnished reading in either 0.0001 in. or 0.001 in.

Standard Gage Co. Inc., Poughkeepsie, N. Y.

Telescoping Sleeve Protects Moving Parts

Made of a special combination of rubber fabric and Fortite, to give flexibility and maximum strength, these telescoping sleeves, for protecting moving parts, are non-hygroscopic, impervious to oil and water, and are of uniform thickness. Sleeves of any diameter or length can be furnished. They are expected to provide a wide scope of application where oil soaking and cracking has been a problem in proper protection of working parts such as leadscrews and hydraulic rams.

A & A Mfg. Co., 2017 W. Claybourn, Milwaukee 3, Wis.

Tool Cabinet Designed to Keep Lathe Accessories Squared Away

The assortment of lathe-tool accessories contained in this cabinet includes high-speed cutters, cutoff blades, formed cutters for threading tools, sleeve and plain bars, light boring bars, and knurled and set screws for tool holders. Labels on each compartment give name and size of accessory contained. Over-all cabinet, not including sign, measures 18¼ x 14⅝ x 14⅛ in. and total weight is 74 lb.

J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.

Heavy Duty Clamps of All-Welded Construction

The plunger clamp, Model D-2 (top) employs a bronze plunger so that weld spatter will not adhere to it and foul up its operation. A 1¾-in. stroke is provided, and pressure is 700 lb. Model C-2 (bottom) is a horizontal toggle clamp recommended especially for milling and drilling operations. Pressure rating is 1000 lb and higher pressures may be obtained by shortening the bar.

General Welding Corp., Cleveland, Ohio

Automatic Dial Assembly Press Built With 4-Ton Capacity

Index table of the PDC automatic press has a six-station dial of 14½-in. dia, is powered with a ¼-hp electric motor, and driven by a positive-locking Geneva motion running in an oil bath. The table has a built-in trip rod to actuate a valve or a switch to control additional mechanism. Press head contains a trunnion-mounted cylinder delivering its energy through a toggle action to the ram. It can be furnished with interchangeable cylinders of 3-, 4-, or 5-in. bore. It offers a 2¼-in. stroke with 1-in. adjustment.

Prevision Detroit Co., Detroit 14, Mich.

Instrument Segregates Different Grades of Mixed Steel Products

The Steelsorter offers an answer to the ever-present problem of segregating steel products of identical appearance and diameter, but of different chemical composition or grade. It separates semi-finished and finished steel products that have become mixed. It differentiates between all types of carbon steel by responding to magnetic differences in the metal, regardless of whether differences are chemical, physical or metallurgical in nature. Designed primarily for use with normal mill stock such as rods and bars, the Steelsorter is fast and easy to operate and is sensitive to minute differences in the steel. One man using this instrument can separate several hundred small samples per hour and a proportional number of large samples per day.

The Steelsorter is portable, can be used anywhere that line voltage is available, and is completely non-destructive.

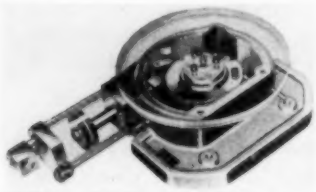
Control unit of the Steelsorter costs $295 without text piece unit. Extra 12 ft. cable costs $11.50. Price for individual test piece units are: ½ in., $85; 2 in. $95; 4 in. $115; 6 in. $135, and 9½ in. $175.

Jones and Laughlin Steel Corp., Pittsburgh 30, Pa.

Magnetic Coolant Separator Cleans 1½ Gal. Per Min

Compact No. 00 BarnesdriL magnetic coolant separator can be placed in the coolant storage tank to remove metal particles and fused abrasives. This unit can clean 1½ gpm. Separators with 5-, 10-, 20-, 30-, 40-, 70-, 120-, and 350-gpm capacities are available.

Barnes Drill Co., Chestnut St., Rockford, Ill.



Working Mechanism of Allen Feed Table Completely Inclosed

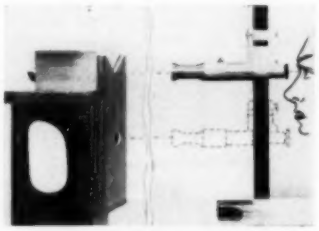
Standard dial feed tables, Models 11EA and 11EB, can be set to index every 90, 60, 45, 30, or 15°. The index plate has 24 teeth. Baffles are used to prevent the pawl from engaging improper teeth when less than 24 indexes are required. The entire working mechanism is completely enclosed, protecting precision parts from dust, chips, and moisture. Accuracy of indexing is guaranteed to ±0.002 of nominal, measured at the periphery of the 11-in. nest plate. The piston always returns to the rear of the cylinder regardless of the index for which the table is set, insuring instant index response and conservation of high-pressure air. Height from base to top of nest plate is 3¾ in, and cylinder diameter is 2¼ in. Model 11 EB includes a sleeved plunger mounted at the rear of the cylinder to actuate a two-way valve. Model 11EA is priced at $200 and 11 EB $227.

The A. K. Allen Co., 495 Wythe Ave., Brooklyn 11, N. Y.

Heated Floor Mat Eliminates Cold Feet in the Shop

Measuring 14x22x5/32 in. and consisting of thermostat and micro-element cast in rubber, these floor mats are to protect workers engaged in machine operations on cold drafty floors. The device plugs into any 110-120-v outlet. Electric consumption is 150-200 watts.

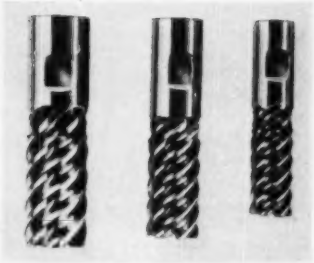
Thermo-Mat Co., Los Angeles, Calif.



Height-Gage Scope Has Five-Power Magnification

Shop inspection instrument has five-power magnification, coated lens, internal focusing, and attaches to any 18- or 20-in. height gage. It provides an erect image throughout and at a working distance of 2½ in. to infinity. Dash-lined crosshair will distinguish 0.001 in. at two feet and lens has concentric circle for picking up hole centers. This height-gage scope is 9¼ in. long and weighs 12 oz.

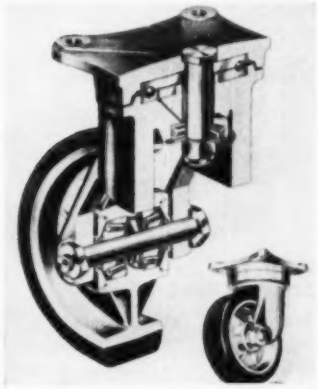
Quality Control Co., 6356 Hollywood Blvd., Los Angeles 28, Calif.



Rotary-Broaching Technique Applied to Milling Operation

The helical cutting edges of these end mills have an extremely large angle compared to the axis of rotation, causing a shear-cutting action on the metal being removed. Essentially they apply rotary-broaching technique to milling-machine operations. Flats have been provided on the straight-shank mills, so that set screws may be used to lock the tool in position in order to resist the in-thrust which is developed by shear-cutting action of the tool. End mills are ground from the solid after having been hardened to between 63 and 65 Rockwell C. Speeds are said to be increased from 30 to 400% over conventional tools, depth of cut from 50 to 200%, and feed up to 500%.

Shearcut Tool Co., P.O. Box 746, Reseda, Calif.



Industrial-Trailer Wheel Units Made With Rigid or Swivel Casters

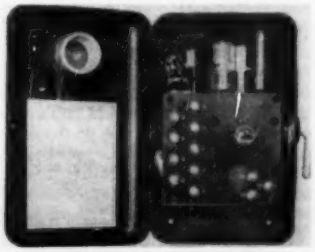
Heavy-duty industrial-trailer wheels and casters are cast of prime aluminum alloy and are said to reduce clutch wear, battery strain, and mechanical fatigue on power towing equipment. They incorporate lifetime sealed-in lubrication and a permanently adjusted king-pin of 1¼-in. chrome molybdenum steel. The casters and wheels are available in caster mount, inside mount, outside mount, and stub-axle outside mount.

Aerol Co. Inc., 2820 Ontario St., Burbank, Calif.

Gage Measures Rolling Pressures On Continuous Strip Mills

Electrolimit pressure gage blocks are mounted on the mill housing between the top bearing and the screw, or between the bottom bearing and the housing. Two gages are required for each mill stand. One gage is on the drive side and the other is on the operating side. Temperature compensator maintains accurate readings over wide temperature range. Gages are available in capacities from 5000 to 3,000,000 lb.

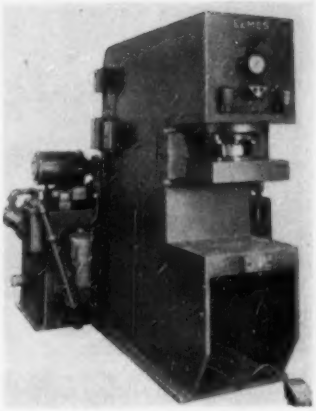
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford 1, Conn.



Photoelectric Controls Are For General Industrial Applications

Series 20 controls are particularly recommended for such applications as counting, conveyor controls, short-range signal systems, motor or valve control, production inspection, machinery safeguards, and automatic controls for specialized industrial processes. It is available with phototube integral with the control or located in a separate housing for applications where space is limited. It is supplied with forward and reverse circuits so that tube replacement is indicated by either an energized or de-energized relay. Terminal panel connections provide for operations from 115- to 230-v supply.

Photoswitch, Inc., 77 Broadway, Cambridge, 42, Mass.



Open-Side Press Performs Three Operations Per Cycle

Operating at 35 cycles per min, this hydraulic press shears, rivets, and straightens forged-steel parts on each cycle. Because work handled is subject to variations in thickness, multiple operations performed on a single press stroke require precision applications and accurate regulation of pressure. The hydraulic power system is said to handle these requirements. Moving platen is 18 x 16 in. and stroke is 3 in. High- and low-pressure pump provides rapid advance, slower pressing speed, and rapid return. Photoelectric safety control stops platen immediately if obstruction breaks light beam at entrance to dies. Sizes and capacities are provided for all service needs.

American Steel Foundries, Elmes Engineering Div., Cincinnati 29, O.

Leather Hand Pads Are Adjustable to Any Size

The GS Safti-Mitt hand pads have a snap-fastened strap which keep them on any size hand and make removal easy. They are made of heavy genuine horsehide and sell for $1 per pair or $11.40 a dozen pairs.

General Scientific Equipment Co., 27th and Huntingdon Sts., Philadelphia 32, Pa.

Vertical Indexing Fixture Is Air-Operated, Automatic

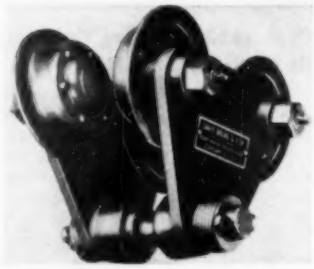
The basic versatility of the No. 14 horizontal indexing unit provides for a wide range of tooling applications for drilling, reaming, countersinking, and tapping operations. Very high production is said to be obtained through ease of changeover, setup, loading, and unloading. The fixture can handle multi-hole drilling operations requiring accuracy of spacing and can be tooled to allow one operator to feed three or four machines. After the cycle has started it continues automatically until all the holes have been drilled and then stops. Maximum number of indexes is 36, minimum number 6, and maximum diameter of top plate is 6¼ in. the fixture is also available with automatic holddown.

Snow Manufacturing Co., 435 Eastern Ave., Bellwood, Ill.

Burring, Chamfering Machines Made With Single, Multiple Stations

High-speed precision burring and chamfering machine handles spur or helical gears as well as multiple-start worms up to 7-in. dia. The machine can be obtained with either single or multiple stations. It operates continuously at a speed of 300 teeth per min or intermittently, when equipped with an automatic work cycle to stop the machine after the part has been completely burred. One or both flanks of the tooth from, including the root, may be chamfered with each stroke of the cutter. The unit embodies enclosed indexing and cutter motion-control unit running in an oil bath, anti-friction bearings, chip tray, adjustable drive gear, and rapid timing device.

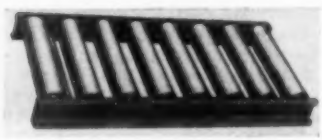
Sheffield Corp., Dayton, Ohio



Self-Aligning Trolley For Electric, Hand Hoists

Deep flanges on the Rocket trolley prevent climbing of the track and the unit is equipped with sealed ball-bearing wheels. Zerk fittings lubricate the axles and the trolley is self-aligning on either straight or curved track, permitting loads to be equally distributed to the four wheels. Size range covers capacities of ¼ to 2 tons, for use on I-beams of from 4 to 12 in. (American Standard Section). The trolley is adjustable to a range of standard I-beam sizes by changing the position of spacers. The Rocket trolley is for use with all type electric- and hand-operated hoists.

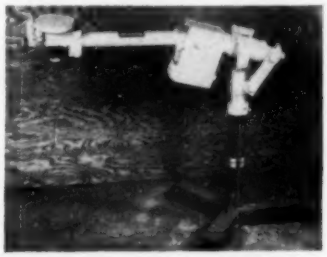
David Round & Son, Broadway and Henry St., Cleveland 5, Ohio.



Roller Conveyors Available In 12- and 18-In. Widths

Utility roller conveyors employ Sage ball-bearing wheels as end bearings for the rollers. The wheels are pressed into each end of 2-in-dia rollers which ride on ¼-in. cold-rolled steel shafts. Side frames of all-welded steel construction are made of 2 x 1 x ⅛-in. channel. Conveyors are available in 5- and 10-ft straight sections and 45 and 90° curves. Widths are 12 or 18 in. with rollers on 3-, 6-, 9-, or 12-in. centers.

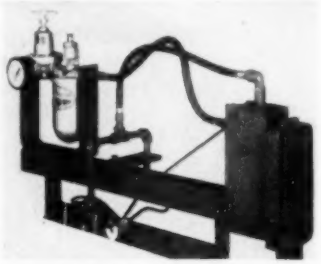
Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.



Maximum Capacity Doubled On Universal Balanced Positioner

The Model 14C500 universal balanced positioner had been altered to allow a maximum capacity of 1000 lb. Work table and work arm now have brake bands for friction. Brake bands are actuated by a knob that is turned in, drawing the band around the rotation. With this feature, work can readily be held during grinding, polishing, and assembly operations without moving.

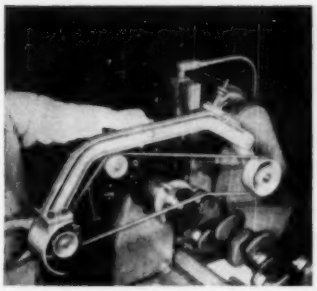
Aronson Machine Co., Arcade, N. Y.



Automatic Unit Lubricates Bearings on T-Beam Rollers

This unit automatically lubricates bearings in 1¼-in.-dia wheels which run on a T-beam. Center distance between wheel is 16 in. Operation is entirely automatic. As each pair of trolley wheels passes lubricator, they trip triggers which release jets of oil-fogged air directly into the wheel bearings. A regulator with back-mounted gage establishes proper operating pressure of approximately 40 psi. Oil volume and timing are adjustable.

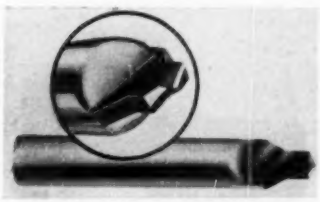
J. N. Fauver Co. Inc., 49 West Hancock, Detroit 1, Mich.



Portable Crankshaft Polisher Constructed of Aluminum Alloys

Constructed of aluminum alloys of high tensile strength, this portable crankshaft polisher weighs approximately 26 lb. It can be operated manually and can be adapted to overhead suspension using counterweight balance. Powered by ½-hp motor, the polisher can be operated with either wet or abrasive belts. Belt widths up to 2 in. can be accommodated.

Tillis Mfg. Co., Elkhart, Indiana



Centerdrill for Hardened Steel

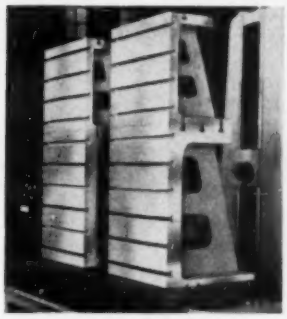
This tool was developed to drill new centers on tools that had been ground off or on which centers were so worn as to be useless. It combines drilling and countersinking in one operation.

National Tool Salvage Co., 6511 Epworth Blvd., Detroit 10, Mich.

Design Simplified On Automatic Self-Contained Drilling Unit

In-line construction of the No. 1000 Series drilling units is said to give balanced action and evenly loaded force. All major parts are made of one-piece castings. Hydraulic check for controlling feed rate is mounted on the rear of the unit with two rigid side bars moving through oilless bushings to carry rapid-advance adjusting bolt. Units may be operated in any position, at any angle for single or multiple setup.

Black Drill Co., 1440 E. 222nd St., Cleveland 17, Ohio



Cast-Iron Angle Plates Are for Precision Machinery

Portage angle plates are for horizontal boring machines, planers, milling machines, and radial drillpresses where accuracy in the machine part is of primary importance. Made in two sizes, one six slots and the other four slots high, they are of close-grain cast iron rough machined, normalized for stress relief to prevent warping, and then finish-machined on all faces and edges. The base of the four-slot plate is the same size as the top of the six-slot case and can be bolted to it. Slots are machined to take American Standard ¾-in. T-bolts.

The Portage Mach. Co., Akron, O.

Alcohol Blow Torch Produces Flame in Excess of 2700 F

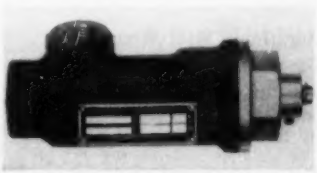
Flames in excess of 2700 F are produced by this blowtorch. The tool has a built-in safety stand that enables it to be set in various positions on a work bench, leaving both of the operator's hands free. A sliding windshield adapts the gun for outdoor use. Length of the torch is adjustable for operations in awkward and tight places. Gun grip handle is molded of Bakelite phenolic. Retail price, $4.95.

Bakelite Div., Union Carbide & Carbon Corp., 122 E. 42nd St., New York 17, N. Y.

Vibration Isolator Designed For Severe Operating Conditions

Low-cost vibration isolator is available for mounting pumps, compressors, fans, engines, generator sets, and other equipment where vibration noise and thrust isolation is required. Steel springs are guaranteed for the life of the equipment, and housings are malleable castings sealed by a cylindrical cork ring which snubs horizontal thrust and prevents all metal-to-metal contact. The Type F Vibro Isolator comes furnished with several standard spring capacities for loads from 10 to 500 lb.

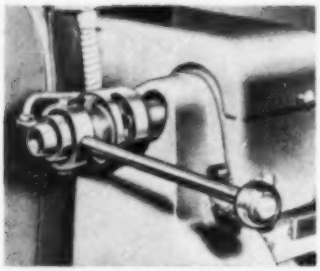
The Korfund Co., 48-39-B, 32nd Place, Long Island City 1, N. Y.



Relief Valve Boosts Practical Working Limits to 500 Psi

Precision hydraulic relief valve is available for pressure settings ranging from 100 to 5000 and opens and closes within 7% differential. Small operating differentials can be obtained for special applications. Design eliminates wire drawing and provides high-volume flow at all pressures. The valve has been tested through temperature variations ranging from 65 to 160° F with more than 5% change in operating characteristics. The entire operating mechanism is contained in a cartridge that can be easily replaced without breaking the line. Pressure adjustments are made by an adjusting screw.

Pantex Mfg. Corp., Pawtucket, R. I.



Production Collet Attachment Fits 1 3/8-in. Spindle Holes

Waltco quick-opening and -closing collet attachment has 1-in collet capacity and will fit any lathe with 1⅜-in. hole in spindle. Cam spool and fingers are said to give a vise-like holding power with minimum pressure on the actuating lever. The attachment can be installed on any lathe without disconnecting the gear guard. It is so designed that at all spindle speeds stock will be free in the open position.

Bell Equipment Co., 5212 Santa Fe Ave., Los Angeles, 58, Calif.

Adjustable Steel Wrenches Cover Wide Size Range

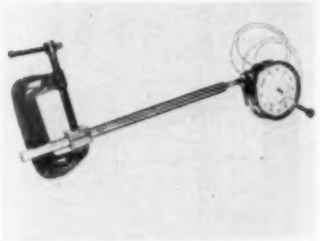
Alloy-steel drop-forged wrenches adjusts to 29 sizes, normally serviced by fixed-size carbon-steel wrenches. The smaller wrench No. OA-24, is 24 in. long. ⅞ in. thick and weighs 10 lb. It adjusts from 1⅜ to 2⅞ in. The larger wrench, No. OA-36, is 36 in. long, 1⅛ in. thick, weighs 22 lb, and adjusts from 2 15/16 to 4¾ in.

Owatonna Tool Co., 383 No. Cedar St., Owatonna, Minn.

Miniature Ball Bearings Made at Reduced Cost

Radial miniature ball bearings, designated as the RO Series, are made in the same 12 sizes as the company's present R precision bearings, but at approximately one-half the cost. Sizes start at 0.0295 in. bore and 0.1181-in. OD. RO series bearings are finished with ball retainers. They have no filling slots and are suitable for both radial and thrust loads.

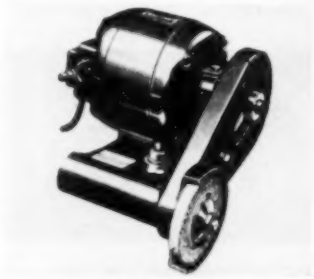
Landis and Gyr, Inc., 104 Fifth Ave., New York, N. Y.



Gears, Jeweled Bearings Eliminated in Dial Indicator

A nylon cord replaces the gear train of the Pacific dial indicator and the unit gives accurate readings to thousandths of an inch. The spring and nylon construction cushions all movements caused by rough work or rapid variations in either direction, cutting down on adjustments. The indicator is fitted with a ball-joint back to provide convenience in setting the indicator. A clamp is provided to fit the indicator to machines. Diameter of the dial is 2⅛ in.

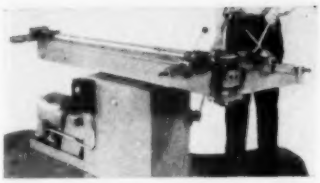
Pacific Machine Tool Co., 1432 Grove St., Oakland 12, Calif.



Bench Grinder Unit Fits Lathes of 9- to 13-In. Swing

The Utility grinder is a dual purpose toolpost and bench grinder which is said to be accurate to 0.0002 in. It fits lathes of 9- to 13-in. swing and is for external cylindrical grinding. It also mounts on shapers, planers, or milling machines for surface grinding. Power is by ¼-hp 5000-rpm constant-speed motor. Grinders are available for both 110- and 220-v ac, 60-c operation, priced at $67.50 and $74.00 respectively.

The Dumore Co., Racine, Wis.



Semi-Automatic Unit Bends Steel Tube Up to 1 In., 16 Gage

Simple hydraulic operation of the bending movement of the Series 1400 bender is initiated from a hand lever which responds to 2-in. movement in either direction to bend or return arm. Clamp die and pressure rollers are closed against the tube by hand-operated toggle locks. The operator selects pre-set angle of bend from a standard four-position turret with positive stop features by means of a handwheel. Average production is 100 to 400 bends per hour; maximum capacity is 1-in.-OD, 16-gage steel tube; maximum bending radius is 8½ in. to centerline of tube. Pump motor is 5 hp, which delivers 7 gpm at an oil pressure of 1000 psi.

Pines Engineering Co. Inc., Aurora, Ill.

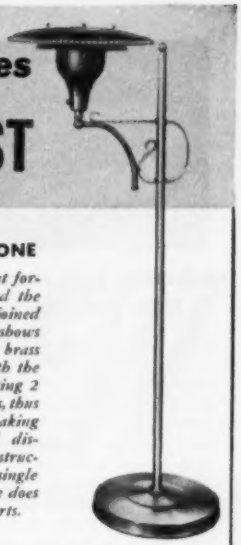
Precision Instrument Covers Rockwell C, B, and E Scales

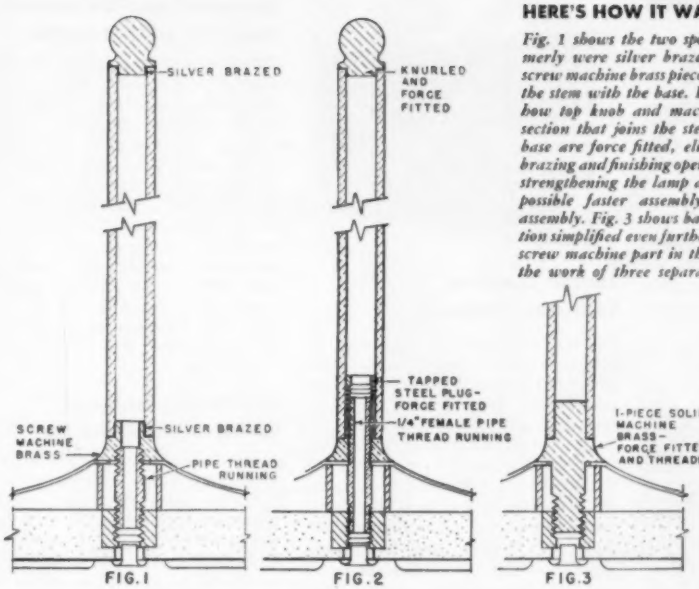
Throat opening of the Newman hardness tester is 1½ in. and the unit covers the Rockwell C, B and E scales. Overall size is 9 x 9 in. with a 3-in. face and weight is 4½ lb without case. The instrument is said to have all the accuracy of any commercial hardness tester and can be used in testing plastics. Complete with one V block and 3 test blocks, C, B, and E, and a full range of transposing charts the tester is priced at $97.50.

J. P. Newman Co., 3544 East Fowler St., Los Angeles 33, Calif.

Sight-Light FLOOR LAMP *Sub-Assemblies*

NOW TURNED OUT 3 TIMES AS FAST





HERE'S HOW IT WAS DONE

Fig. 1 shows the two spots that formerly were silver brazed, and the screw machine brass piece that joined the stem with the base. Fig. 2 shows how top knob and machined brass section that joins the stem with the base are force fitted, eliminating 2 brazing and finishing operations, thus strengthening the lamp and making possible faster assembly and disassembly. Fig. 3 shows base construction simplified even further . . . single screw machine part in the base does the work of three separate parts.

Lamp stem is Revere ¾" O.D. x .680"—.6835" I.D. 70-30 brass tube hard drawn. Support bracket is ⅛" x 1¼" Revere Brass Strip while the outside floor base spun shell is made from 12" wide x .0253 Revere Brass. Screw machine parts at top and base of lamp are Revere 240 type screw machine rod.

Joint efforts of Revere and Plainville Metal Works resulted in elimination of 2 silver brazing and finishing operations . . . faster assembly.

IN working with manufacturers on their various problems, Revere not only takes into consideration how its products can be used to help solve these problems, it also delves into the production methods employed. As a result there have been many cases where Revere and the manufacturer have collaborated to work out new production methods that have not only produced a better product but have also cut production costs.

Newest example of this is the manner in which Revere collaborated with the Plainville Metal Works, Plainville, Conn., in developing the Sight-Light patented reading lamp which they manufacture for the Sight-Light Corp., Deep River, Conn. Originally the knob at the top of the lamp stem was silver-brazed in. Revere suggested this could be a force fit.

Formerly, there had been a screw-machine brass trim section at the base of the lamp stem which had a shoulder on it that was also silver-brazed into the tube. A ¼" running pipe thread nipple with an unthreaded section anchored this screw machine part to the weighted base which was covered by a spun brass disc.

The engineers at the Plainville Metal Works tried various ideas to improve this construction. The final result was a machined section of solid brass that is joined to the lamp stem with a force fit, while the opposite end of this section is threaded for fastening to the base.

Results: 1. Elimination of two silver brazes. **2.** Elimination of two finishing operations, one of which was acid cleaning, and the other, the removal by hand of the discoloration caused by the acid cleaning. **3.** Sub-assemblies turned out 3 times as fast through a new, faster assembly method that permits finishing before assembly on a mass production basis instead of by hand. **4.** A substantially stronger lamp. **5.** A trim, one-piece screw-machine part at the base that is turned out faster and in a single machine set-up.

Perhaps Revere can be of help in developing or improving your product—cutting your production costs. Why not tell Revere *your* metal problems? Call the Revere Sales Office nearest you today.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

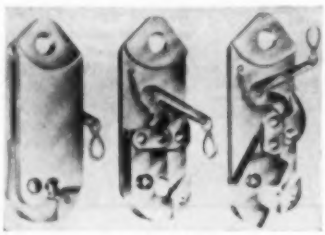
• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

Adjustable Posts Add Rigidity To Lathe Toolholder

Two sizes of the Sackman adjustable toolholder are in production for use on 9- and 16-in. lathes. Larger sizes can be made to accommodate special needs. The holder is said to accomplish difficult assignments in holding wide tools on comparatively narrow bases with complete absence of chatter. A series of adjustable posts accommodates tools of different sizes and permits further adjustment as the tool wears and is resharpened.

W. H. Sackman Co. Inc., 44 N. 4th St., Philadelphia 6, Pa.



Safety Drop Hook Provides Easy Release by Toggle Action

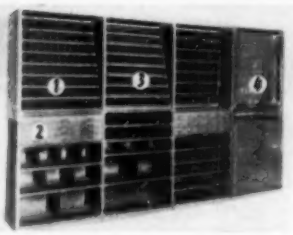
The Coffing drop hook, a mechanical unit using toggle action, is capable of lifting, hauling, and easily releasing any weight up to 6000 lb. All hooks are tested at 100% overload and only 40-lb pull is required to release a three-ton load. Jaws automatically remain in open position for easy reloading.

Coffing Hoist Co., Danville, Ill.

Increased Elevation Available In Hydraulic Sheet-Feeding Tables

A compound-lever arrangement in the No. 1196 sheet-feeding table is said to provide exceptionally low height and a greater range of elevation. The unit has a capacity of 10,000 lb and range of elevation is from 12 to 36 in. Platform is 36x96 in. End and side extensions are available to increase platfrom area. The table can be furnished with wheels and casters to make it portable.

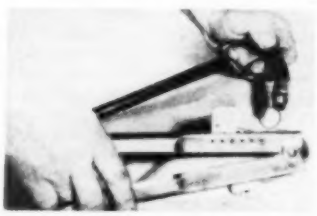
Lyon-Raymond Corp., 4267 Madison St., Greene, N. Y.



Storage Equipment for Toolrooms, Stockrooms

Sloping-front unit (1) provides 88 openings in 8 depths with shelf dividers adjustable every inch. Each drawer of drawer-case unit (2) has five dividers. The unit is for small tools and cutters' supplies. Sloping-shelf unit (3) has 108 compartments on 8 shelves for storing drills, reamers, and taps. Swinging panel unit (4) allows almost 27 sq ft of storage area. Holes are punched every inch. The panel is for milling cutters, gages, and templets.

Lyon Metal Products, Inc., Aurora, Ill.



Ferrule Crimping Tool For On-the-Job Maintenance Work

Light-weight tool is for crimping metal ferrules when making on-the-job hose repairs or installations. Two strands of music wire in looped form, attached to the operating handles in such a way that closing the handle contracts the loop, effect the crimp in the hose. Hoses from ½ to 1½ in. outside diameter can be handled by the tool.

A. Schrader's Son Div., Scovill Mfg. Co. Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y.

Aluminum Power-Belt Conveyor Made in 11- to 21-Ft Lengths

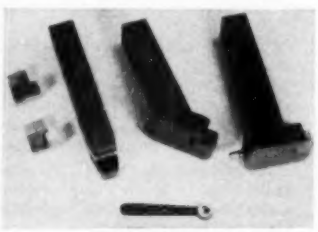
Weighing less than 350 lb, the Stevedore, Jr. two-wheel power booster and stacker is said to be almost as easily rolled into position as a wheelbarrow. The conveyor is furnished in 10- and 16-in. belt widths and five standard lengths from 11 to 21 ft. The unit operates horizontally, or at angles up to 40°, depending upon belt surfacing and materials conveyed. Two-way belt travel permits both loading and unloading.

The Rapid-Standard Co. Inc., Dept. ASJ, 342 Rapistan Building, Grand Rapids 2, Mich.

Cold-Drawing Compound For Hot- or Cold-Rolled Bars

Houghto-Draw 357 is a heavy paste containing high-melting-point waxes and fats, combined with a colloidal pigment. It is for use in cold drawing of hot- or cold-rolled bars or rods. It has high adhesive properties and is applied by immersion of the work in a tank containing a solution of 5 oz of Houghto-Draw 357 to a gallon of water maintained at 170 F.

E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.



Toolholders Designed for Carbide-Tipped Toolbits

Different shapes of toolbits and various grades of carbides can be interchanged in these toolholders. As shown, toolholders are available in both straight and offset styles. Mating serrations permit toolbits to be adjusted for wear and a simple locking device permits changing without disturbing the holder in the machine.

The Apex Tool & Cutter Co. Inc., Shelton, Conn.

Developed by three years of research . . . and now refined by tens of millions of dollars' worth of new equipment!

Gulf's GREAT NEW No-Nox

DESIGNED FOR TODAY'S POWERFUL NEW ENGINES!

Today's new cars have the most powerful *engines* ever made. AND—

They require a super, anti-knock gasoline.

Such a gasoline is the *new* No-Nox. It was especially designed by Gulf scientists—working hand-in-hand with leading automotive engineers—to give you *maximum* performance in your new car.

With a gasoline like this great new No-Nox, you can be *sure* your new car will perform at its brilliant best.

And the new No-Nox not only gives *new* cars peak performance. It also gives new life, new pep, and stops knocks in older cars too — even many with heavily carboned engines!

So no matter what model you drive, get a tankful of the *new* No-Nox today.

See for *yourself* what a difference it makes!

Whisper-Quiet, Knock-Free Power!
Easy, Fast-Firing Starts!
Quick, Safe Passing!
Unexcelled Mileage!

Terrific Power in Every Drop!

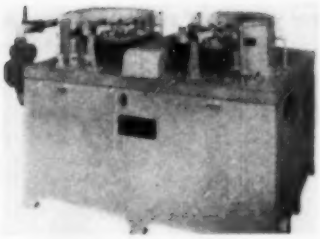
Good Gulf—our famous "regular" gasoline —is now better than ever, too!

Gulf Oil Corporation • Gulf Refining Company

Adjustable Drilling Heads Made with 3, 4, or 6 Spindles

Offering a wide range of adjustments and provided with a finger-tip locking arrangement, these fully adjustable drilling heads can drill in squares, rectangles, circles, triangles, and a variety of irregular patterns. It is fully geared and all spindles have grooved-ball thrust bearings as well as needle bearings, wherever possible. Heads are made with 3, 4, and 6 spindles in sizes from 0-¼ in., from 3/16 to ½ in.

Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y.

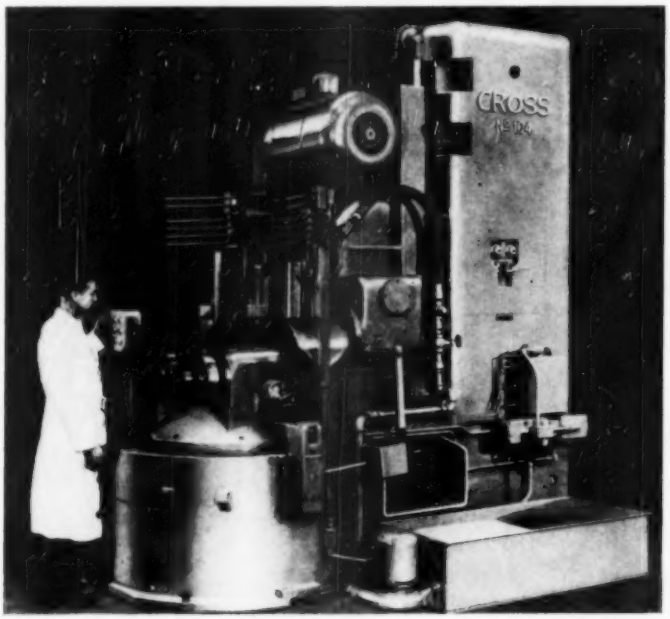


Automatic Gas-Fired Machine For Localized Heat-Treating

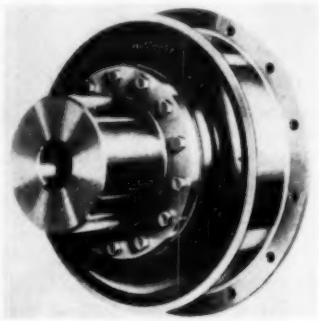
Heavy-duty chisels are hardened and drawn in local sections at both ends at a rate of 60 per hr on this automatic gas-fired machine. The unit is adaptable to size and shape of pieces requiring localized heat-treatment. Work is hand loaded to guides on two turntables, and held in position by tension arms. A hydraulic indexing movement of the turntable carries the work through seven stations: first it is heated by two open burners; second, quenched and hardened by two oil streams; third and fourth, oil is washed off by two water streams; fifth, it is drawn by two open burners; sixth, cooled; and seventh, unloaded. After work has been treated in the cycle of the first turntable it is reloaded on the second turntable, moving in the opposite direction, for similar treatment at the other end.

The machine includes an oil recirculator and heat exchanger. Variable speed control provides for changes. Fuel consumption is approximately 60 cu ft of 1000 Btu gas per hr.

Selas Corp. of America, Erie Ave. and D. St., Philadelphia 34, Pa.



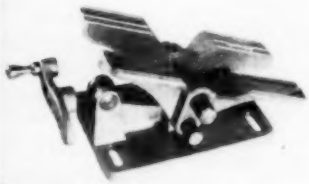
MACHINE FOR MILLING planet carriers enables one unskilled operator to plunge mill three gear clearances on 85 front and 85 rear carriers per hr at 100% efficiency. This rate is made possible by use of a two-station index table with two pieces being loaded at the first station, while two others are being milled at the second. Cutting speeds of 425 sfm are obtained with a 450-lb flywheel attached to each spindle. ***The Cross Co., Detroit 7, Mich.***



Torque Capacity Increased In Falk Airflex Coupling

Improvement in rubber composition and bonding are said to have increased torque capacity of the Airflex coupling 20% over previously published values. Hubs and adapter plates have been redesigned to facilitate disconnection and removal of the entire gland assembly. Redesigned components are interchangeable with the equivalent components of couplings now in use. Stiffness factors can be controlled and are available for torsional analysis.

The Falk Corporation, Milwaukee 8, Wisconsin



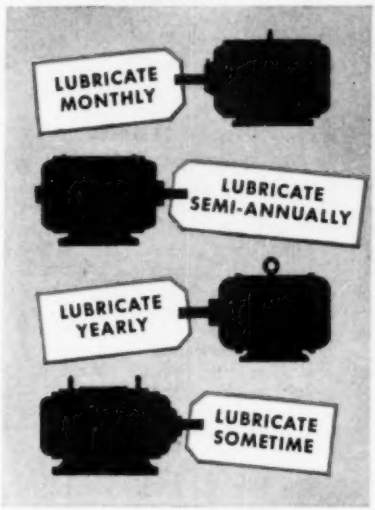
Tilting Motor Base For Fractional-Hp Motors

Tilting motor base weighs 10 lb and has reversible mounting brackets for versatility of motor installation. The handle provides easy adjustment of motor to desired position.

Gerbing Mfg Corp., 650 W. Washington Blvd., Chicago 6, Ill.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



Why take a chance with "Once-in-a-while" lubrication?

Why fuss with motors that require lubrication "every so often?" Whether it's monthly, yearly, every two or three years, or just an indefinite "sometime," it is as much trouble remembering when to lubricate, as it is to do the lubricating. And it certainly isn't a very good way of making sure bearings get proper greasing attention.

There *is* one way to be *sure*. That's with Life-Line motors. Lubrication is *positive*. Bearings are pre-lubricated and factory-sealed. *No* further lubrication is required!

This is the modern way of lubricating motors. Development of special lubricants, up-to-date manufacturing methods and special seals have made it possible.

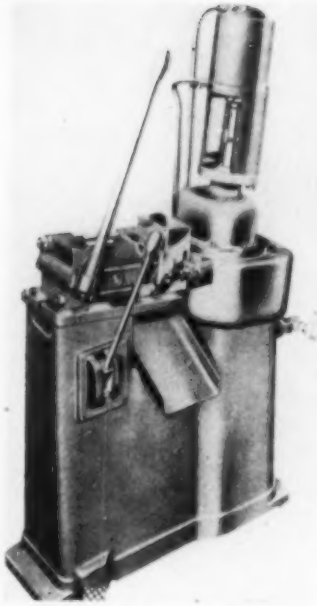
Records of nearly half a million motors, operating in every type of industry, indicate that pre-lubricated bearings offer: an average saving of $2.70 yearly per motor . . . 41% fewer motor outages due to faulty lubrication . . . complete freedom from lubrication attention.

Today, periodic lubrication is a costly nuisance. So why take a chance with it when Life-Line offers positive lubrication at no extra cost. See for yourself. Ask your Westinghouse representative for a copy of "Facts on Pre-Lubricated Bearings," B-4378, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21559

— If you figure LIFE-COSTS . . . you'll figure LIFE-LINE —

Westinghouse *Life-Line* Motors

INDUSTRY'S LEADING MOTOR



High-Speed Die-Casting Machine Uses Fast-Chill Principle

Zinc alloy die-casting machine of 1-lb capacity utilizes the principle of fast chill and high cycling speed on low-cost small single-impression dies. Direct mounting explodes air into the cylinder causing supersonic piston speed which shoots hot molten metal into the cavity before it can cool off, permitting a water-cooled sprue which solidifies instantly resulting in a high-speed cycle. Average production of 500 to 700 shots per hr can be maintained. Die sizes up to 6x9 in. can be used. Floor space required measures 24x12 in., and the unit weighs 470 lb.

DCMT Die Casting Machine Corp., 16¼ Duane St., New York 13, N. Y.

Magnetic Bit Holder Added To Pneumatic Screw Driver

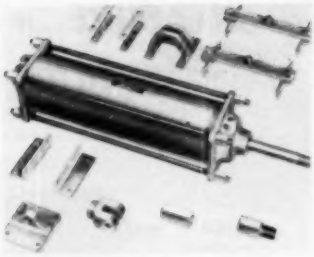
Alnico permanent-magnet bit holder, set in a nickel-steel case, serves the dual function of keeping bits in place by magnetic attraction and holding screws in position for driving. Inexpensive ¼-in. hex insert bits can be used with this holder. The bits can be replaced by merely pulling one out and inserting another.

Keller Tool Co., Grand Haven, Mich.

Bronze Hammer for Hard Blows On Delicate Machinery

The Safe-T-Hammer is a bronze implement for use in place of copper and brass hammers where hard blows must be struck without injuring delicate machine surfaces. The lightweight electrically welded tubular-steel handle is diamond knurled and somewhat flattened for strong comfortable grip. All-metal construction eliminates the danger of annoying wooden-handle breakage. The hammer is available in 13 different weights ranging from ½ to 15 lb.

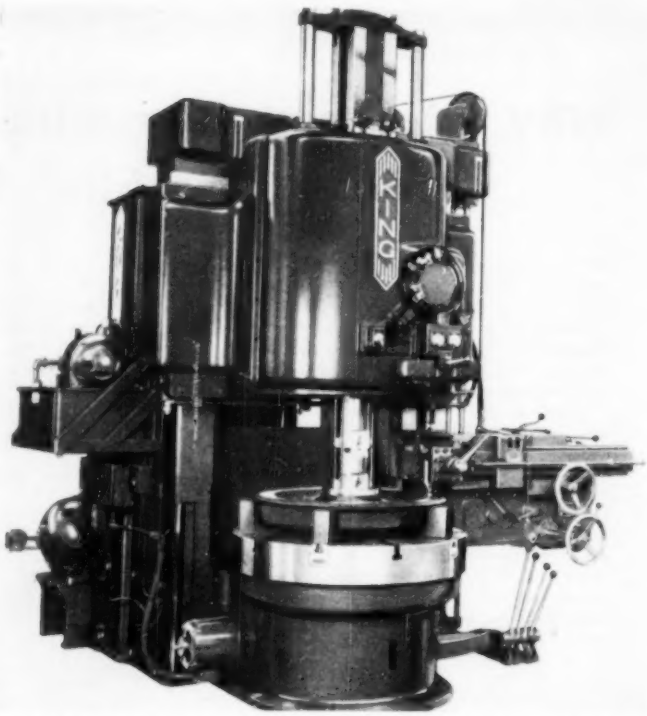
Univertical Machine Co., 14831 W. 11-Mile Road, Berkeley, Mich.



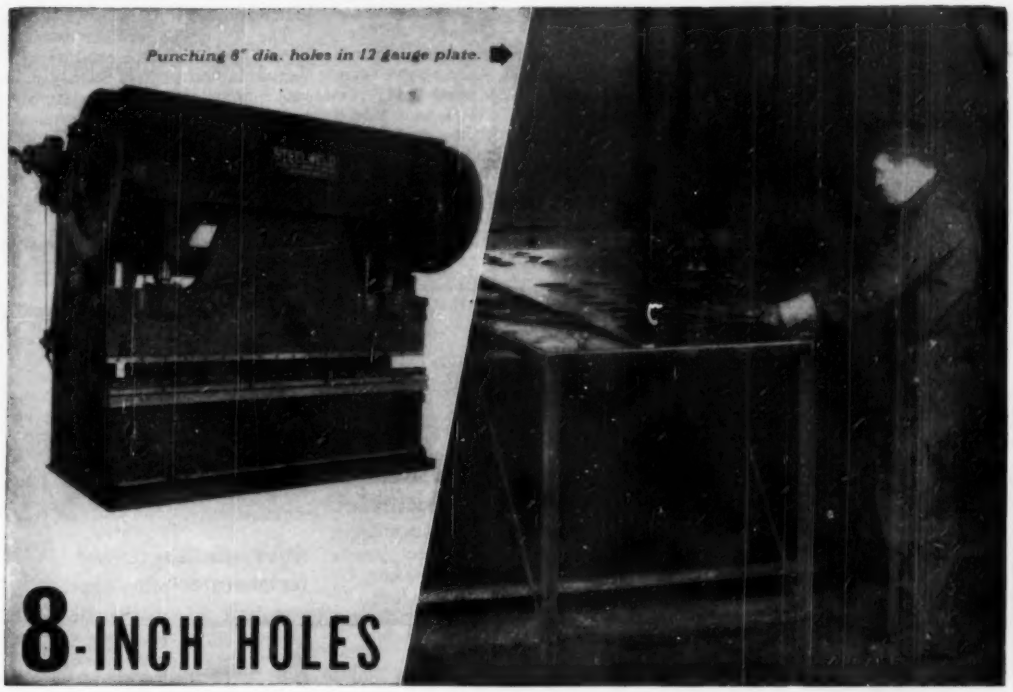
Medium-Duty Series Added to Air-, Hydraulic-Cylinder Line

Medium-duty air and hydraulic cylinders are for remote-control operation, material handling, clamping or holding, and other applications where straight-line motion is used. The cylinders are of tie-rod construction giving positive protection against leakage at joint of tube and head. The variety of head and rod attachments provide for almost universal mounting requirements.

Ledeen Mfg. Co., 1600 S. San Pedro St. Los Angeles 15, Calif.



LOCOMOTIVE WHEELS are bored and faced on this machine. Ram cycle is fully automatic and can be set to rapid traverse to work, rough bore at one feed, finish bore at another feed, form a radius at another feed, then dwell and rapid traverse out of the work. Wheel is held by motor-operated power chuck. *American Steel Foundries, King Machine Tool Div., Cincinnati 29, Ohio*



8-INCH HOLES *with a* BENDING PRESS

There are other ways to make large holes in steel plate but many Steelweld owners find their press handles this work easily and speedily. Best of all, when the job is done the dies can be changed quickly and the machine set up to make sharp bends, smooth curves, corrugate or other forming operations.

In most shops Steelwelds are never idle. They are NOT one-purpose machines. When one job is completed, there is always another ahead for Steelwelds. They are versatile tools easily adapted to practically every plate-forming operation.

Steelwelds are not only "Jack of all" metal-forming jobs, but they are "master" of them as well, for they are accurate, efficient and easy to operate.

Get the facts on Steelwelds. See what they can do for you.

GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
1410 East 281st St. Wickliffe, Ohio

STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

Torque Wrench Operates Without Dials or Gages

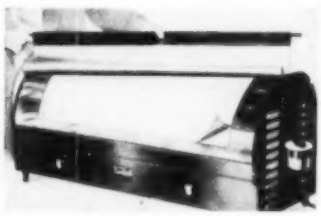
JO-Line torque wrenches cover a range from 2 to 36,000 in-lb. There are no dials or gages to watch and tension breaks automatically when proper torque value is reached. They are available with micrometer adjustment over operating range, or may be ordered pre-set to any torque value. Wrenches can be easily reset in any toolroom to conform with changes in torque specifications.

JO Manufacturing Co., 8442 Otis St., South Gate, Calif.

Screwdriver Attaches to Electric Hand Drills, Drillpresses

The Electric screwdriver is an attachment for ¼-in. electric hand drill or drillpresses. It permits power driving of wood screws as well as self-tapping metal screws. A friction-clutch arrangement is said to insure smooth, efficient operation. The unit retails at $2.95.

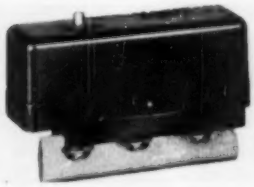
Pentagon Metal Products Corporation, 121 New Jersey Railroad Ave., Newark 5, N. J.



Low-Priced Whiteprinter Takes 24 x 36-In. Sheets

The Spee-Dee whiteprinter uses the Diazo (moist or ammonia dry) process to produce positive-reading whiteprints at less than 2 cents per sq. ft. Exact prints are provided in as little as 30 sec. Duplicate drawings, tracings, layouts, sketches, letters, invoices, agreements, records, data sheets, charts, or any written or printed matter may be reproduced. The size is 38 in. wide x 16 x 15½ in. high and light source is four 250-watt bulbs and two 500-watt bulbs. Net weight, 58 lb. The machine costs $137.81.

Peck & Harvey, 5736 Northwestern Ave., Chicago 45, Ill.



Double-Throw Precision Switch Offers High Electrical Capacity

Small-size plastic-case switch which simultaneously makes and breaks two separate circuits has 5-amp, 28-v dc inductive-load rating. It can be assembled in most Micro actuators and metal inclosures and attachments with minor modifications.

Micro Switch, Freeport, Ill.

Grinder Precision Spindles For External, Internal Use

High-speed precision grinding spindles are for standard grinders and are of Fafnir-bearing construction throughout. One of the spindles, Type H, is especially for external grinding applications, and the other three, Types H-3, H5-1½, and H5-2 are for a wide variety of internal grinding operations. Diameters of the polished spindles are normally 2⅛ in., but can be ordered to other sizes. Spindle H has a top speed rating of about 3450 rpm. Other spindles can operate at up to 30,000 rpm.

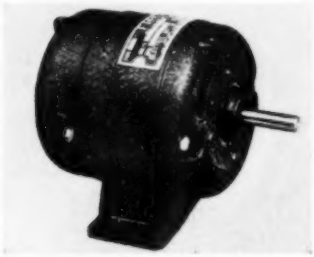
The Type HE grinder was designed specifically for attachment to engine lathes, planers, boring mills, and similar machinery to facilitate precision external and internal surface-finishing operations. It is powered by Master Electric ½-hp repulsion-induction motor. Spindles can be turned end for end for back lathe mounting.

The Maxwell Co., 300 Broadway, Bedford, Ohio

High Productivity Claimed For Internal Grinding Wheels

The high productivity claimed by manufacturer for V1 bond wheels is said to be based on production runs covering a variety of materials and applications. Wheels are reported to cut faster, cooler, and freer. A greater range of work is said to be obtained from one grade while surface finishes are improved and closer tolerances held.

The Carborundum Co., Niagara Falls, N. Y.



Fractional-Hp Motor Made With Die-Cast Case

Model 1100 is a dynamically-balanced single-shaft brush-type universal motor, 1/20 hp intermittent duty and 1/25 hp continuous duty. It can be equipped with any EMC gear-reduction unit with hundreds of ratios available for low-output speeds. It can be supplied with electric governor for constant speed.

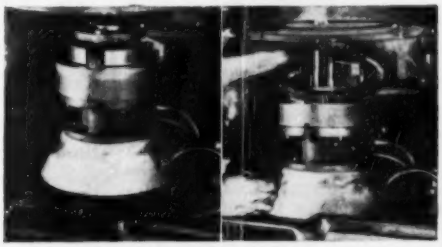
Electric Motor Corp., Div. Howard Industries, Inc., Racine, Wis.

MACHINES USED	ONE SHEAR-SPEED (internal)	ONE SHEAR-SPEED (external)	
Part Produced	Cylinder (housing)	Pressure Plate	Hydr. Piston Plate
Approx. Pitch Diameter	12"	12"	12"
Length of teeth cut (in.)	1.016	.976 (2 pcs.)	.562 (2 pcs.)
Output per hour	85-90	200-240	200-240
Machine Cycle Time	24 secs.	24 secs.	24 secs.
Estimated Tool Maintenance Cost	***	1/10th that for generating tools	
Change-over time	None Required	Approx. 2 hrs. total (complete set-up)	
Equivalent number of generating machines for same production	12 (single spindle)	Six (8-spindle type)	

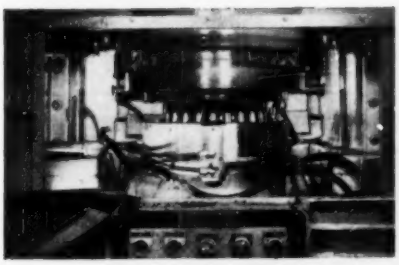
***—No tool grinding required in first 5000 pieces produced.

Maximum Allowable Errors: Involute profile .....0.0004 in.; Index .....0.001 in. with any tooth; Parallel.....0.001 in. per inch of tooth

1. This 12" diameter internal gear . . . *finish-cut in only 24 secs.!*

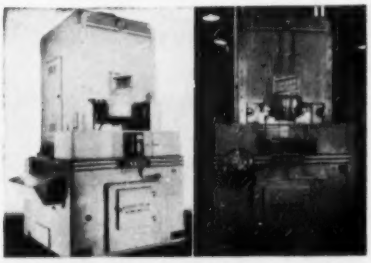


2. Two mating 12" external gears . . . *in another 24 secs.*

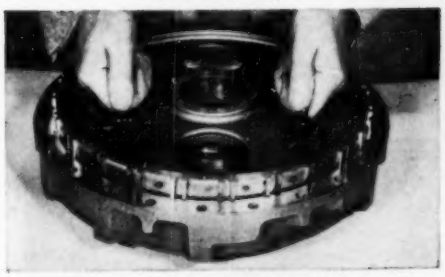


5. 5000 internal gears *without a tool grind.*

4. Tool cost per piece *. . . cut 90%.*



3. 80-90 complete sets of 3 gears per hour *. . . on only two machines.*



6. Precision finishing *. . . to 0.0004" on profile.*

That's gear cutting, Packard!

For information on Shear-Speed machines—for form-cutting of internal or external spur gears, splines or other irregular forms—ask for Bulletin 1800-47

COMPLETE from blank to finished gear EQUIPMENT

MICHIGAN TOOL COMPANY 7171 E. McNichols Road Detroit 12, U.S.A.

Vibration Reduced in Redesigned Hisey Grinders, Buffers

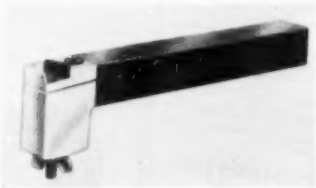
Larger pedestal base designed into the Hisey Economy grinders, buffers, and polishers are said to reduce vibration to a minimum. Bench grinders range from ¾ to 2 hp, and pedestal units from ¾ to 5 hp. Two- and four-bearing buffers and polishers and three-bearing combination buffers and grinders can be obtained in 1-, 2-, 3-, or 5-hp sizes.

The Hisey-Wolf Machine Co., Cincinnati 8, Ohio

Power-Truck Lifting Device Speeds Handling of Drum Products

Faster action in lifting, transporting, and stacking various forms of drums and drum products is said to be accomplished with this power-truck lifting device. It consists of a steel frame with base attached to the elevating mechanism in the truck's upright column. It is not wider than a standard size 55-gal. oil drum and has a handling capacity of 1000 lb. In the center of the upper cross member is an adjustable hook which engages the upper chime or rim of the drum, enabling the driver to tilt it backwards. At the bottom of the frame are two foot plates, beveled and grooved to conform to the circular contour of the drum. As the drum is titled backward and the truck moves forward, foot plate slides under the raised portion and the lower chime slips into the grooves.

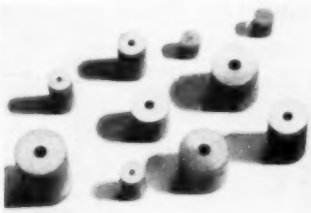
Elwell-Parker Electric Co., Cleveland, Ohio



Ejector Toolholders Have Hard-Chrome-Plated Heads

Chrome plating is claimed to increase the life of the injector toolholder for solid-carbide insert up to 500% by eliminating chip erosion. A special controlled clamping action is said to give stress-free rugged support to the blade; and the locking screw, located on top of the holder, facilitates insert interchange without removing the holder from the toolpost. Wing. nut on the bottom eliminates the need of a wrench in locking the adjusting screw.

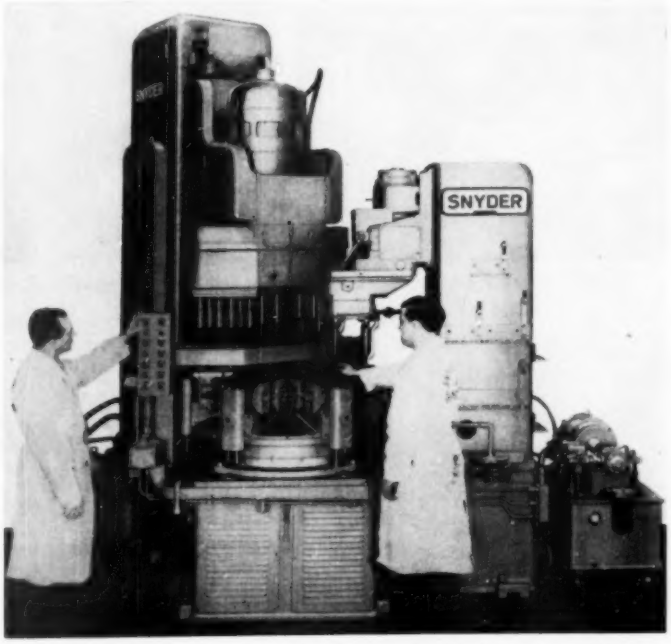
Super Tool Co., 21650 Hoover Road. Detroit 13, Mich.



Cemented-Carbide Die Nibs Made in Rough-Cored Form

Standard header die nibs are available in 17 sizes ranging from 9/16-in. OD with 0.06-in. cored hole, ¾ in. long to 1¼-in. OD and 0.33-in. cored hole, 2⅛ in. long.

Carboloy Co. Inc., Detroit 32, Mich.



SIX-STATION VERTICAL drilling and tapping machine drills, spotfaces, chamfers, and taps 512 differential bearing caps at 100% efficiency. Work cycle is 21 sec, and is automatic after the starting button is pressed. Machine is electrically interlocked for safety and can be operated by unskilled labor. Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit, Mich.

Horse Laugh

The foreman of this textile loom beam company knew how to perk up their sales. He figured that a magnesium beam

would be lighter . . . even stronger than the wood and cast-iron ones. But his boss gave him the horselaugh.

Said the shop had never handled magnesium. The foreman came to Aluminum Company of America, light-metal headquarters.

He learned that simple shop procedures

make handling magnesium no problem.* From personal help

from Alcoa Engineers and books on designing

and fabricating, he learned that finished loom beam barrels

could be made from American Magnesium Extrusions. He found that American Magnesium foundries would cast the beam heads

at exceptionally low prices. With these facts, the foreman tackled his boss again . . . and convinced him. Now their lighter, stronger, splinter-free, warpproof beams are becoming standard in mills all over the country.

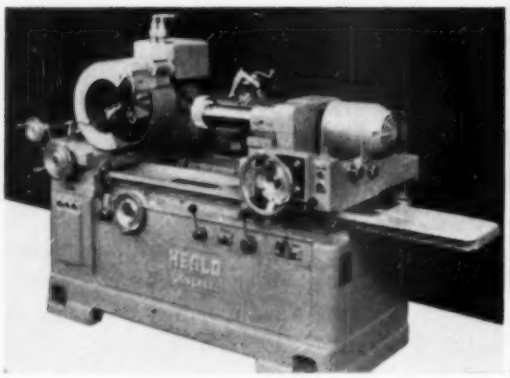
*No change in insurance rates.

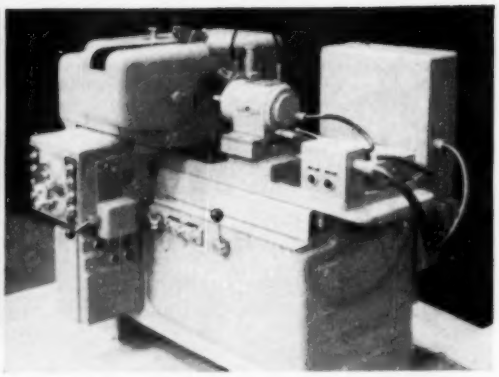
These two, free books on magnesium and our broad technical experience can help your products, too. Write Aluminum Company of America, sales agent for American Magnesium Products, 2106E Gulf Bldg., Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

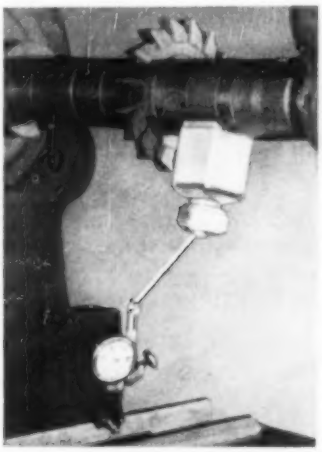




Grinder Handles Both Toolroom And Production Operations

Model 274 universal internal grinding machine is designed for a wide variety of toolroom work, but may be equally well applied to longer production operations. Workhead can be swiveled up to 90° and is driven hydraulically permitting an infinite variety of speeds within a range of 40 to 350 rpm. The machine will grind straight or taper holes, straight or taper outer diameters and flat or convex surfaces.

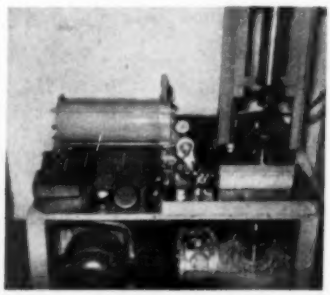
The Heald Machine Co., Worcester 6, Massachusetts.



Magnetic Device Holds Test Indicator, Light to Check Setups

The Miti-Mite is a magnetic-base holder for test indicators or Handi-Lites which can be mounted on any iron or steel surface, either round or flat. Equipped with a universal ball-and-socket swivel arm, it is said to simplify a wide range of test setups. The Alnico magnet exerts approximately 50-lb pull and is reported to last for years without re-energizing. The unit can be obtained as a magnetic-base holder for test indicator, as a magnetic base Handi-Lite complete with extra bulb, or as a combination holder for both test indicator and Handi-Lite.

Enco Mfg. Co., 4522-24 W. Fullerton Ave., Chicago 39, Ill.



Flat-Edge Drawn-Shell Trimmer Handles Material Up to 16-Gage

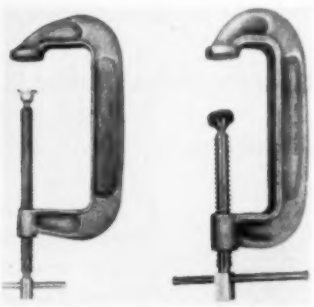
Universal machine will trim drawn shells of practically any depth up to and including 16-gage material, with minimum radii on irregular shells of ⅛ in. on all sheet alloys that can be satisfactorily drawn to size and shape. A universal external rotary cutter blade is provided and a profile mandrel, about ½ in. thick, to fit the drawn finished shell is built for each different operation. This engages the rotary cutter blade at the point of the trimming operation. Work cycle can be varied and a max of 65 shells per min can be obtained. The machine can also be used on second operations such as special forms, beading, flanging, knurling, and similar operations on finished drawn shells.

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Internal Grinder Employs Central Hydraulic System

Model 180 centerless internal grinding machine is designed for battery installation with a central hydraulic system. Central coolant supply and power source for optional high-frequency equipment are available. Machines are completely automatic; several units can easily be tended by a single operator. Where large-volume production is required these battery-type installations are reported to be extremely economcial.

The Heald Machine Co., Worcester, Massachusetts.



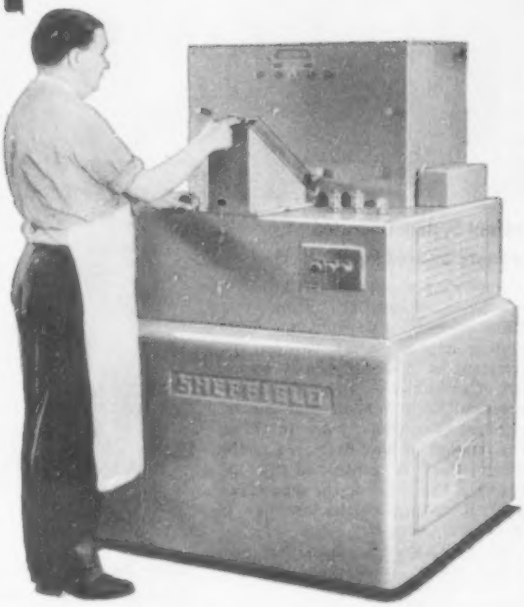
C-Clamp Design Includes Modified Acme Threads

Standard-duty carriage clamps and heavy-duty machinist clamps have precision-cut spindles with modified acme threads. They are available in malleable castings in the standard-duty line and pearlitic steel in the heavy-duty clamps. Handles are of adequate length to enable a man to apply the strength of his entire hand rather than only two or three fingers. Square spindle head on heavy-duty clamp is for applying a wrench when additional leverage is required.

Wilton Tool Mfg. Co., 925-941 Wrightwood Ave., Chicago 14, Ill.

$79,754 NET PROFIT IN 38 MONTHS

with this SHEFFIELD AUTOMATIC GAGE



From Nov. 1, 1945 through 1946-7-8 more than 68,400,000 automotive shock absorber pistons were checked and segregated according to undersize, oversize and five tolerance ranges of .0005 each.

Original cost of $14,400 was amortized in 5½ months.

Net profit of $79,754 had been realized in 38 months when a major design change in the shock absorber caused the machine to be shifted from full time to periodic inspection of replacement parts—*but it is still in operation* and producing more profit.

This is but one of many case histories of amazingly high and quick returns on investments in Sheffield Multiple and Automatic Inspection Equipment.

At your service are competent engineers for consultation or survey, *without obligation.*

Address Consultation Service 5537

Other Sheffield Automatic and Multiple Gages

MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS

the *Sheffield* corporation

Dayton 1, Ohio, U.S.A.

Coolant System Operated By Foot-Powered Pump

Coolant-supply unit for drillpresses, tapping machines, or milling machines consists of a heavy steel tank holding approximately two gal. of lubricant or coolant, a foot pump, 5 ft of plastic hose, and a nozzle attachment with bracket that can be attached to practically any machine. The amount of flow delivered to the cutting tool is controlled by the stroke of the pedal on the pump. The Lubri-King unit weighs less than 10 lb empty.

W. A. Horejsi Co., Dept. AM, 2001 James Ave. N., Minneapolis, Minn.

End-Finishing Machine Provides 3-In. Capacity

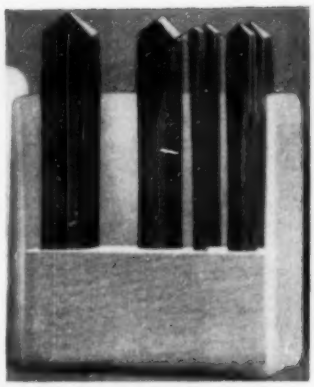
Center-drilling bars, turning a shoulder on a tube, chamfering screw-machine stock, hollow milling the end of a forging, deburring tubes, and facing radius on the end of a rod are among the operations performed by the Series 700 floor-model tube and rod end-finishing machine. Work is held stationary by an automatic air-operated chuck of the pusher type, while the revolving spindle is fed to the work by means of a manually-operated lever. Tools and chuck-jaw inserts are interchangeable to fit work to 3-in. max dia. Spindle drive motor with variable-speed control for work diameters is enclosed within the base.

Pines Engineering Co. Inc., Aurora, Illinois.

Blast-Cleaning Abrasive Carried in Water Stream

Hydro-finishing is a modified form of impact blasting using an abrasive, suspended in liquid, which is delivered to the blasting nozzle by means of a circulating pump. Velocity is imparted to the suspension as it flows through the blasting nozzle by the injection of compressed air, normally at 90 psi. The operation is conducted in a water-tight hydro-finish cabinet provided with a hopper tank for mixing, storing, and recollecting the suspension. The blasting gun is equipped with two lengths of flexible hose, one for abrasive feed, and one for air supply. Vision windows, loading doors, air-control valves, a ventilating system which removes fog created by blasting, window-wash system, and lighting are all provided in the cabinet. Manufacturers say machine parts can be processed and held within tolerances as close as 0.0001 in. Abrasives as coarse as 60 mesh and as fine as 5000 mesh can be utilized. In the finer mesh range Pangborn supplies an abrasive called Pangbornite which is an almost pure silicon dioxide.

Pangborn Corp., Hagerstown, Md.



Hard-Metal Drills Ground From Sintered Carbide

Firthite Drills are designed especially for drilling of metals up to 66 Rockwell C hardness. They are ground from solid Firthite (sintered carbide) cylinders, and are pointed and relieved for free cutting. Life of these drills is said to be as much as 50 times that of conventional high-speed drills. Firthite tools are stocked in 1/8-, 3/16-, 1/4-, 5/16-, 3/8-, and 1/2-in. sizes and are packed in a complete set of six drills in pocket-size kits.

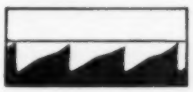
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Time-Delay Valve Operates By Volume Measurement of Air

For operation on all Ross in-line operating bodies from 1/4 to 1 1/4 in. sizes, this valve operates by volume measurement of air. The use of regulated air is said to assure constant repetition of time sequence. Valves are furnished in straightway, 3-way, normally opened, and normally closed models.

Ross Operating Valve Co., 120 E. Golden Gage Ave., Detroit 3, Mich.

No, it's the magnified "horizon" of a series of Nicholson file teeth as viewed through an *optical comparator* (a "seeing eye" instrument that profiles objects and enlarges many of them up to 125 times). Note that the teeth are all uniformly high, uniformly spaced—ready to share the work evenly. The added checkups afforded by this scientific watchdog help greatly in keeping the file-cutting machines in perfect adjustment—thus preventing the uneven spacing that usually results in high and low teeth like this:



And what good are low file teeth if they can't reach the work? None at all. What's more, shirking their duty puts an extra strain and wear on the reduced number of high teeth. The results in poor file work, shortened file life and excessive file costs are obvious.

Uniform cut—as precise as human skill and well-designed, efficiently maintained file-cutting machinery can achieve—is one of many features of Nicholson files that spell QUALITY in the highest sense. They have enabled the world's foremost file manufacturer to guarantee *Twelve perfect files in every dozen.*

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FREE—"FILE FILOSOPHY"

New (sixteenth) edition of this world-famous book on kinds, use and care of files available to executive, purchasing and production heads, shop foremen, key mechanics. Send for it.

NICHOLSON FILE CO. • 29 ACORN STREET • PROVIDENCE 1, RHODE ISLAND
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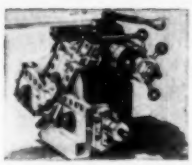
NICHOLSON *A FILE FOR EVERY PURPOSE*

To make a product as nearly perfect as fastenings can make it . . .

The only place to use a cheap screw is when you don't care if it holds or not. Usually shearing or loosening costs thousands of times what you "save" on the cheapest fasteners.

You pay no premium for *genuine* Allen Head screws—only enough to *assure* uniform strength and Class 3 fit.

Allen gives you the toughness of Allenoy steels, 100% Pressur-forming, the advantage of every proved threading method, quality control at every step, including automatic instrument controlled atmosphere heat treating.



This leading machine tool manufacturer uses Allen Head screws by the hundreds of thousands for compact design, assured holding power and maintenance of precision adjustments.

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Write the factory direct for technical information and descriptive literature.

WARNING
Allen-Type screws aren't necessarily Allen-Made.
Get genuine Pressur-formed Allen Head screws in this black and silver box.

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MANUFACTURING COMPANY

Hartford 2, Connecticut, U. S. A.

NEW YORK, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES

ROUND TABLE *Discussion*

HOT POTATO

THE WEAK LINK in Ed's chain of arrangement is surely the fact that he and one of his two leading men will be on holiday at the same time.

With proper foresight on Ed's part, the trouble need never have arisen, but probably his fears are ill founded, for experience teaches us that our greatest fears seldom materialize. Football supporters here in Scotland have a bit of sarcasm which they like to sling across the field at a favorite who may, on occasion, displease them by having an "off day." Here it is "come off the field and strengthen the team."

Who knows, Ed's absence on vacation may be the other man's opportunity to show his paces and, if he should rise to the occasion, Ed's absence from the team would have strengthened it to the extent that it would demonstrate to all concerned that the understudy could be relied on to fill the boss's shoes competently should need arise.

That, of course, is just as it should be in all industry and Ed's boss should make it his business to see that such a policy is pursued throughout the works. The wise, experienced director usually has two or three strings to his bow in the matter of managers and foremen and should see to it that they measure up to a high standard of preparedness against possible contingencies.

If we imagine a slightly different set of circumstances, this comes out more clearly. Suppose Ed to have arranged that he and his two potential foremen should each be on vacation at different times and Ed had been laid aside with an illness that prevented his taking any part in the business of the section even in an advisory capacity, say, from his home or from a hospital and that this had happened when one of his understudies was on holiday. In such circumstances the other understudy would be required to carry on, or the one on vacation would have to be recalled. Recalling the other man from holiday would be unpleasant for him and would expose a weakness in Ed's organizing ability, since such procedure would imply that two men were required to fill Ed's shoes, a pill no good managing director would like to swallow. I am all for giving a good man tangible proof that his service is appre-

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SIP's exclusive combination of hydraulically-operated tables and the world-famous SIP built-in optical measuring system provides proved superiorities. Great flexibility . . . *Guaranteed* accuracy for *all* work-table and spindle-head settings—.0002".

Ask us to tell you all the SIP features designed to give you improved production . . . maximum precision . . . steady, trouble-free performance 'round the clock.

SPECIFICATIONS

HYDROPTIC-7

WORKING RANGE

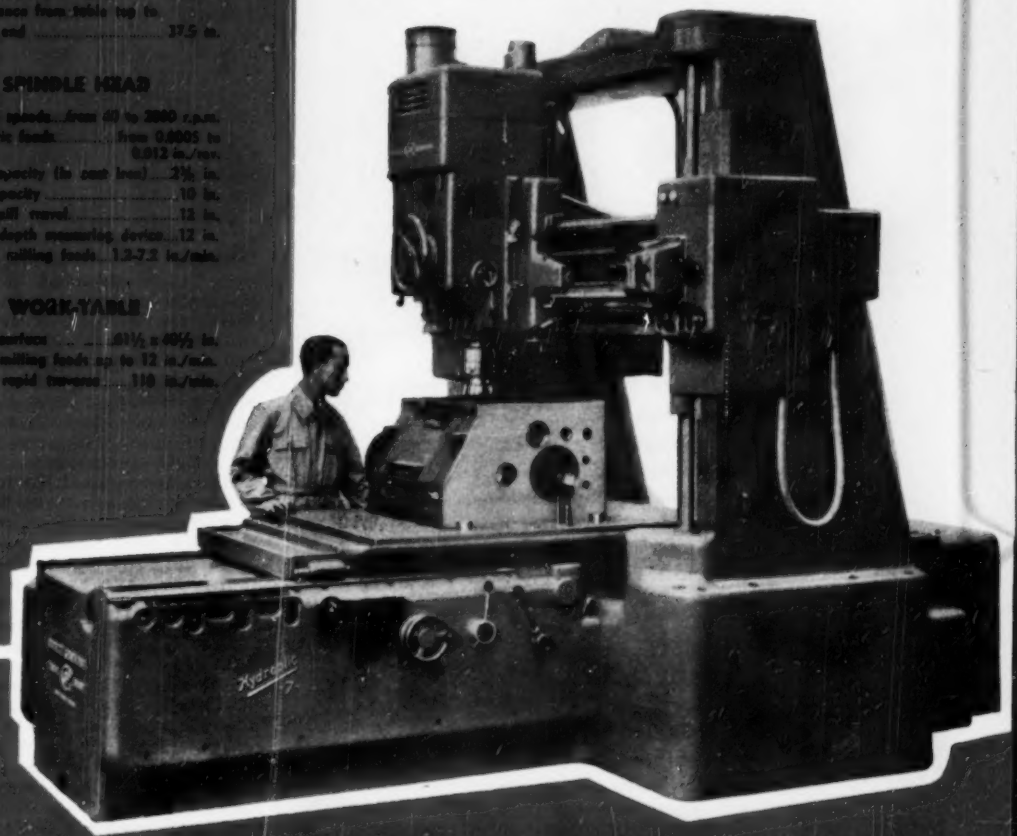
Nominal table travel ..... 55 in.
Nominal spindle head travel ..... 40 in.
Free space between uprights ..... 65 in.
Max. distance from table top to spindle end ..... 37.5 in.

SPINDLE HEAD

18 spindle speeds...from 40 to 2000 r.p.m.
8 automatic feeds ..... from 0.0005 to 0.012 in./rev.
Drilling capacity (in cast iron) ..... 2½ in.
Boring capacity ..... 10 in.
Spindle quill travel ..... 12 in.
Range of depth measuring device ..... 12 in.
Automatic milling feeds ..... 1.3-72 in./min.

WORK-TABLE

Working surface ..... 81½ x 40½ in.
Hydraulic milling feeds up to 12 in./min.
Hydraulic rapid traverse ..... 110 in./min.



AMERICAN SIP CORPORATION

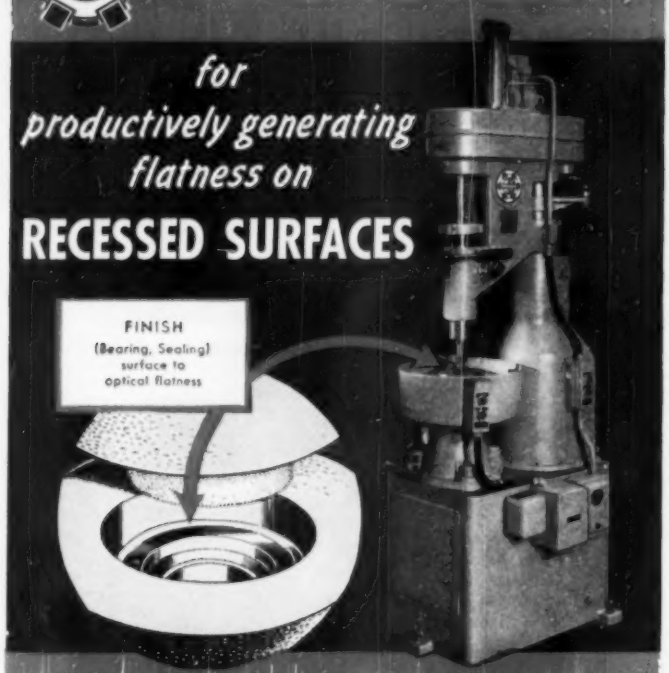
100 East 42nd Street New York 17, N. Y.

MICRO MATIC

MICROFLAT

for productively generating flatness on

RECESSED SURFACES



● Microflat machines may be equipped to finish recessed surfaces.

The location of a surface does not limit the application of the MICROFLAT machines. Any surface that can be machined can be finished with this equipment. The surface finish and flatness generated can be controlled and held to any specified requirement.

The machine shown above is equipped with a timer and an air cylinder. The operator loads the part into the fixture and starts the cycle. The fixture rotates, the bonded abrasive finishing surface oscillates and rotates. At the end of a predetermined time cycle the spindle automatically withdraws. Production is 300 pieces per hour.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN

DISTRICT FIELD OFFICES:

ciated, but I am dead against giving him the feeling that he is indispensable. To do so is to throw, open wide, the door to trouble. Unless a man is unusually modest, the feeling that he is regarded as indispensable is sure to tilt his balance. It takes a very steady head to carry a full cup.

Really good understudies should be given plenty of scope and from time to time should be given an opportunity to carry most of the load in preparation for one day assuming full responsibility, temporarily or permanently. In return for this they should be much more highly paid than their normal, routine duties require. Such payment is a good investment if made to the right type and if he is not the right type, he should not be an understudy. It is an economy and an insurance to have one or two good well-paid understudies for each chief foreman. Holiday dates should be fixed to suit the wishes and plans of the staff in so far as those dates are not opposed to the interests of the work. When the two clash, individuals must give way. Those holiday dates should be fixed in good time to enable all concerned to make suitable arrangements.

C. D. Mackinnon
Airdrie, Scotland

•

UNLESS both works and staff are so small that an understudy is not a practical proposition, it is surely unwise to consider upsetting holidays, the dates of which will have been accepted by the Old Man. It is not as though holidays, vacations, are a kind of reward or sugar-stick for being good boys, they are essential for both physical and mental health. All sorts of arrangements will have been made, accommodation for wife and children will have been booked, to alter which can be embarrassing as well as costly. Holidays without Daddy are no holiday at all.

That works must be in a somewhat unenviable position, because for the successful handling of one order, the holiday arrangements of even one member of the shop staff must be upset. If he were the only man of his kind, had two heads or three eyes, for example, such action could be understood, but, even then, the man might die as, some day, he assuredly would. Would the firm then go out of business or into the backwoods until a new man had been incubated? They could, as a safety measure, keep him on the ground and by tucking him up in bed securely every night, do all that was humanly possible to safeguard his health. He would, however, still die some day.

Seeing, therefore, that all men in due course must pass on at the behest of Father Time, would not the circumstances mentioned provide a good opportunity to allow some budding foreman of the future to try his wings and show of what he was made? It is as well to realize also as Ed says, that employees sell their brains and experience, not their whole lives and it is well that Old Men should remember this. Those who do, and remember also, that a bargain is a bargain, will be likely to retain both their Eds and their Als and should find, when an emergency really arises, that they will be ready too, holiday or no holiday, without grumbling or sour faces.

P. E. James
Lindum, England

•

THE FIFTH WHEEL

ALL TALK and discussion today in management is that production costs have to come down—that more production per man and machine has to be produced, or else, so that products can be sold more cheaply. And yet here we have an example where management, even if dissatisfied with the result of Al's effort, is certainly taking the least likely method of improving the position by creating a special inspector responsible only to the front office. That alone is enough to make other supervision unsettled and when that condition occurs, they cannot concentrate on their job and give their best efforts to their employer.

If they felt Al had more work than he could efficiently take care of, then the special inspector should be another assistant responsible to him, and not to the front office.

Should the inspection department worry about equipment? Definitely not. Serious trouble has occurred in many shops where inspection and supervision of production overlapped. Scrap has resulted where inspection has interfered with production through misunderstanding. It is far wiser to definitely keep them responsible for their own job.

Of course, on the other hand, where we have had trouble in the past, we often had and welcome suggestions from the inspection department that have proved a remedy for the trouble. Any supervisor who won't listen to a suggestion that might solve a problem, is guilty of stupidity and neglect, no matter from who suggestions may come.

It is true that just as soon as the men in the shop knew that Stebbins was responsible for maintenance and efficiency of shop tools and equip-

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BETTER QUALITY . . .
GREATER OUTPUT
PLUS
High Precision Accuracy
Automatic High Precision Sizing
Fast, Heavy Stock Removal
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NEW QUILL-TYPE
HIGH PRODUCTION
HYDROHONERS
MODEL 728
Completely automatic, electronic control of uniform size within tolerance of 0.0001 to 0.0003-inch is a production-proven feature of these new unit-assembled, hydraulically actuated, heavy-duty Hydrohoners.
With this simplified, spindle-in-quill construction torque and thrust is restricted to the centerline of the spindle—alignment is accurately maintained—weight of parts in motion is minimized—stroking speeds may be higher without increasing power input—all conventional mechanical linkages and hydraulic systems are simplified.
To explore the amazing, new possibilities of the Quicker, Better, Lower Cost Method of Production Processing by Microhoning.
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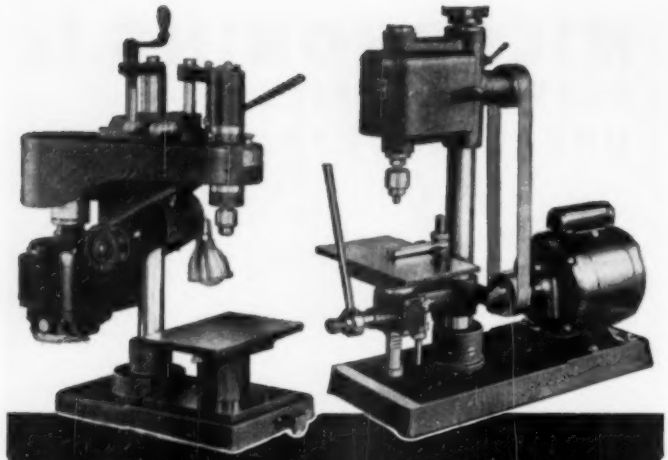

SMALL HOLES
(.004"—5/16")

PRECISION HOLES
(Straight & Round)

Fast

SMOOTH HOLES THREADED HOLES

"AS SPECIFIED"

At spots where small, precision holes must be produced on fast production schedules, and where no excuse for failure to produce "as specified" is good enough, the Hamilton line of small hole, super-sensitive drills and tappers enjoy the full confidence of the men who are charged with responsibility for getting the job done.

Year after year, 80% of the sales of these machines are to those who know them through use.

For complete specifications, write for illustrated literature, today.

THE Hamilton TOOL COMPANY
830 SO. NINTH STREET • HAMILTON • OHIO • U • S • A.

ment and responsible only to the front office, many of them would complain and find fault, as when any new boss is put in charge of a machine shop. His attention is quickly called to all the defects, fancied or real. In many cases men do it just to make a new boss's personal acquaintance—size him up, so to speak.

Arthur Silvester
Niantic, Conn.

•

EXCUSE ME, PLEASE

A FATHER can make a child do what he wants it to do with a whip or a threat. The foreman can also make the employee give him cooperation by threatening to fire him. Any fool can condemn, criticize and throw his weight around but such methods have sharply undesirable results. The only way to get someone to do something you want them to do is to make them want to do it.

Charles Schwab once remarked, "I consider my ability to arouse enthusiasm among men the greatest asset I possess, and the way to develop the best that is in a man is by appreciation and encouragement."

There is nothing else that so kills the ambitions of a man as criticism from his superiors. I never criticize anyone. I believe in giving a man incentive to work. So I am anxious to praise but loath to find fault. What does the average man do? If he does not like something he raises—, and if he does like it he says nothing. In the home, in school, politics or business we all do a better job under the spirit of approval. If we find our temper is aroused we may have a fine time unloading our feelings. But what about our employees? Will they share our pleasure? It's very easy to say "do this or do that," but by saying "you might consider this" or "do you think it would work this way," you may find a more receptive attitude on the worker's part. It also gives him a feeling of importance. We cannot ride roughshod over the feelings of others. We cannot find fault, issue threat, or criticize an employee without hurting the other person's pride.

A thoughtful word and an understanding attitude will go far in persuading the employee to our way of thinking. My daughter brought home a dog which greeted me with wagging tail and leaps of joy. Then came a period of training. We wanted the dog to sleep in the basement but I had to whip and drag her by the collar to get her to go in the basement. I finally started calling her and clapping my hands at the top of the basement steps and then patted and

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For the precise hardening and tempering of expensive tools and dies—specify Lindberg Hardening and Tempering Furnances.

FOR HARDENING—eliminate finishing due to scale and decarb with simple accurate atmosphere control.

FOR TEMPERING—obtain the exact "Rockwell Hardness" needed for the ultimate performance from your tools and dies.

Write for your copy of "How To Plan Your Toolroom Heat Treating Department".

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LINDBERG FURNACES

The new Gairing E-Con-O-Mill, Series 6500, 10-inch diameter, with twenty blades.

now-

PATENT APPLIED FOR

The New GAIRING

E-CON-O-MILL *Series 6500*

with a greater number of blades

Two years ago we introduced the original E-CON-O-MILL, the cone-type face mill, that saves on *grinding costs*, cuts down *tool inventory*, and reduces *machine down-time*.

Now we present this new E-CON-O-MILL, with all the economy features of the original, *plus* a greater number of blades.

Cutter bodies are of the cone type, and are made in diameters of 8, 10, 12, and 14 inches. They support the blades full length in accurately machined slots.

Blades of ½ by 5/16 tool bit type are tapered two ways, and tungsten carbide tipped. They come finish ground, and may be sharpened individually with the aid of the same combination grinding fixture and checking gage used for the original E-CON-O-MILLS. They are quickly inserted without removing the cutter from the machine. The same blades serve all sizes of Series 6500 cutters.

Available in three types: to cut steel, cast iron, and non-ferrous materials, each type with the proper carbide, and the tips ground to the correct radial and axial rakes.

Locks (the same as used in the original E-CON-O-MILL) are assembled in one piece, and remain attached when blades are removed.

The GAIRING Tool Company,
Box 478, Detroit 32, Michigan

The original Gairing E-Con-O-Mill, Series 2500, 6-inch diameter, with six blades.

GAIRING TOOLS

praised her. It worked like magic and I wonder why we don't use the same common sense when trying to change people that we use when trying to change dogs.

A. E. Salmons
Philadelphia, Pa.

■

DRESS UP OR DRESS DOWN

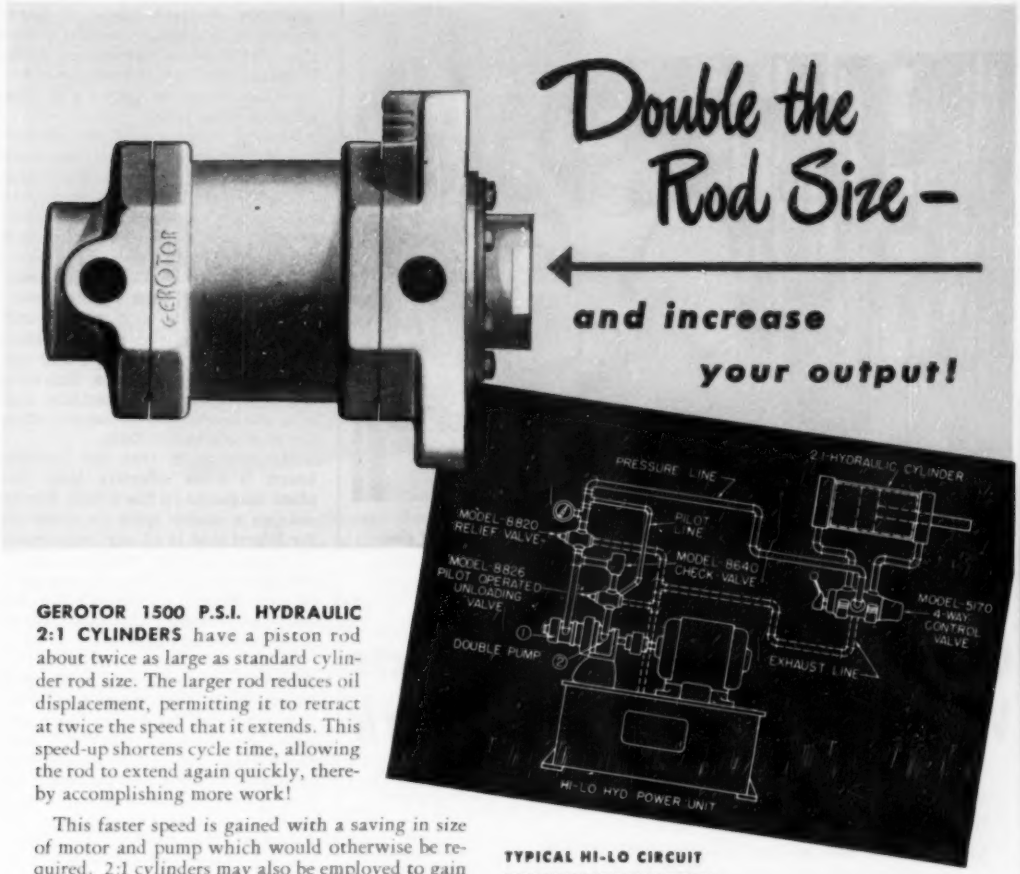
THE BULLETIN BOARD sure has its place in the well-organized shop, providing it is kept in respectable condition.

I have found that orders and matters of interest have a greater effect on many men when posted. It gives your orders that official bearing and is more lasting and respected than verbal orders concerning employees as a whole. It saves time and repeating orders, which is considerable when you have many employees and are too busy to peddle out general orders.

In the big plants this is taken care of by personnel depts. Other smaller shops often turn the posting over to an office employee. If the foreman has an order to post he should have it typed in the office, sign it and let the official poster place it on the board if possible. They can set it up neater and in better grammar than some of us may possess in the shops.

The person responsible should see that the board is kept clean, that expired or old orders are removed. In case an important order exposed on a plain board becomes dirty or torn, it should be replaced with a renewed order. This latter can be avoided by using the glass-enclosed board. I have seen cases where the plant painted the board several times a year with different colored 4-hr enamel to make it noticed and re-

"This is a worm!"



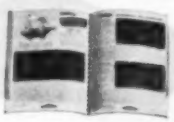
GEROTOR 1500 P.S.I. HYDRAULIC 2:1 CYLINDERS have a piston rod about twice as large as standard cylinder rod size. The larger rod reduces oil displacement, permitting it to retract at twice the speed that it extends. This speed-up shortens cycle time, allowing the rod to extend again quickly, thereby accomplishing more work!

This faster speed is gained with a saving in size of motor and pump which would otherwise be required. 2:1 cylinders may also be employed to gain identical retracting and extending speeds, as well as to support larger loads where straight linear motion is used.

•Available in 6 standard mountings: Foot, Trunnion, Center Line, Blind End Flange, Rod End Flange, and Clevis; in 10 bore diameters; in any stroke up to 96"; and with cushioning.

Remember—Gerotor Hydraulic Cylinders have Keeper ring design, permitting the cylinder to be rotated to convenient pipe connection.

Send for Catalog Section No. 104 illustrating and describing all types and sizes of Gerotor Hydraulic Cylinders.



TYPICAL HI-LO CIRCUIT FOR HYDRAULIC PRESSES

This circuit illustrates a press application where rapid speed and low pressures are required for the major portion of the stroke and high pressures are required for the "squeeze" portion of the stroke. The output of both the low pressure high volume pump (2) and the high pressure small volume pump (1) is directed to the hydraulic cylinder at a low operating pressure. When sufficient work load builds up, pressure in the system increases and the model 8826 pilot operated unloading valve unloads the output of pump (2) while the output of pump (1) is still directed to the cylinder. Direction of piston travel is controlled by model 5170 4-Way control valve. The horsepower requirement for this type of circuit is much less than if a single pump of sufficient volume and pressure for the application were used.

RIVETT LATHE & GRINDER Inc.
DEPT. AM-5 • BRIGHTON 35, BOSTON, MASS.

WHEN YOU APPLY HYDRAULIC OR AIR POWER *Plan with* **GEROTOR**

AIR AND HYDRAULIC VALVES AND CYLINDERS, HYDRAULIC POWER UNITS

As a result of increasing production of the "Shavemaster" and other electrical products, Sunbeam Corporation, Chicago, has repeatedly extended their use of McCaskey "Visible Filing and One-Writing" systems, continuing their . . .

Control of Production and Costs With Minimum Clerical Work

Thousands of posting operations are eliminated, for example, by quickly filing copies of jobtime tickets on McCaskey Planning Boards for this accurate control of work-in-process by part numbers and operations.

Additional copies, made with one writing, supply the Payroll Department with data for incentive and non-productive earnings, the Cost Department with identical information for analyzing actual performance compared with standards, and Employees with a "receipt for pieces made" and a later verified record of earnings.

This one multi-copy form thus provides the data for complete production records and control with a saving of thousands of hours of clerical work annually.

●

Write for a demonstration and applications to your particular needs or mail the coupon for descriptive folders. No obligation.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me folders describing McCaskey Production, Cost and Payroll Controls.

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AM 5-1

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

spectable. Several places I have known use a cartoon to draw attention. The favorite was any by J. R. Williams who always draws an interested audience and gets the laughs with his shop jokes.

Another was to post the theater bill of the week with news items on what was doing that night or the following one. Some shops even posted important national news. For instance I saw President McKinley's assassination and later Mr Roosevelt's death on shop bulletin boards. The boards are read by men coming in or going out mostly and should not be placed at an entrance or at the time clocks where they are likely to hold up a line. Entrance to a department, at the fountain, tool crib, stockroom and foreman's office are good places for them.

My opinion is that the bulletin board is more effective than the plant magazine on the whole. For as soon as a reader spots an order on the board that is of any importance he begins the shop telegraph and it soon gets around. I have known men to take the shop magazine home and never know for days of some item of importance that appeared.

Some rush home, especially in summer, eat, and are off to the ball game and let the magazine ride till they get time. Put a bulletin up and they are curious. You will find among the day workers that they read your bulletin and become your best distributor of effective orders in no time. Last but not least, the board should be used for sick, convalescence, birth and death notices to impress employees that the board is of importance and mutual interest.

Henry Rasmussen
Niagara Falls, N. Y.

●

BY ALL MEANS dress up the bulletin board. If the bulletin board is placed in the right spot, if it is up to date and notices or other material, such as pictures, sport activities, cartoons, safety posters are posted it is one of the quickest ways to reach all the employees.

In our plant the bulletin boards are placed near the time clocks—they are easily seen both coming in or leaving the plant. The bulletin boards are inclosed in glass and the framework painted in attractive colors. Schedules of our bowling teams, the lineups, and won and lost figures are also posted. In addition, pictures, company notices, slogans, industrial pictures, names of bond purchasers, news letters, etc. Bulletin boards are equipped with lights and are kept up to date by the personnel depart-

ALL through the summer—through hot, humid days and hot, humid nights—the biggest thief in America will be raiding your plant, stealing your profits, stealing your steel.

In every department—where raw steel comes in, where it is stamped or milled or machined or ground, where it is pickled or cleaned or assembled—the moisture in the air is always helping that big thief, RUST, to rob you of production—atom by atom—taking pennies and dimes and dollars out of your pocket.

But you don't have to put up with this monstrous moist-month thievery. The Oakite Technical Service Representative in your vicinity can help you fight and conquer RUST. He is well equipped with methods and materials for:

1. Removing rust from raw stock
2. Preventing rust while parts are being processed
3. Cleaning and de-rusting in one operation
4. Cleaning with simultaneous conditioning for painting plus protection against rust before and after the metal is painted.

FREE Write today for full information on Oakite methods for arresting RUST in every part of your plant.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

TRADE MARK REG. U. S. PAT. OFF.

MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

OAKITE PRODUCTS, INC.
24 Thomas Street, New York 6, N. Y.

Send me, without obligation, complete information on Oakite methods for:

☐ Removing rust ☐ Preventing rust
☐ Cleaning and de-rusting in one operation
☐ Cleaning and paint-conditioning with rust prevention

Name.....

Company.....

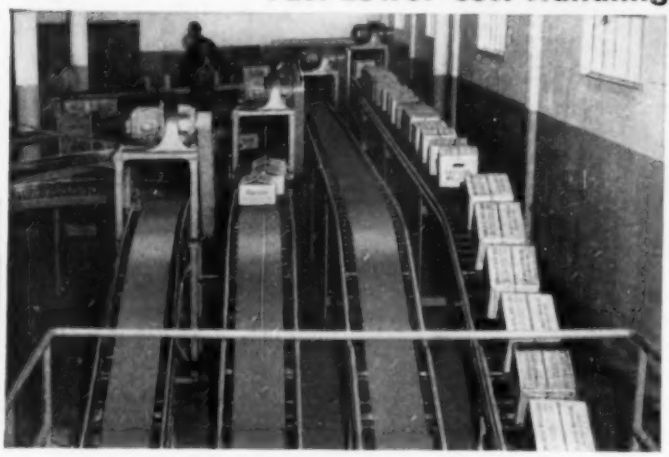
Address.....

Look at All

FOUR WAYS

To get

Fast Lower-Cost Handling



1 WITH ROLLER OR BELT CONVEYORS

— Order and cleanliness — freedom from congestion — smooth flowing coordinated movement of commodities — these are the plus advantages of roller or belt conveyors, gravity or power, in addition to their time, money, and manpower economies.

2 with the EXTENDOVEYOR

— compact, mobile, easily maneuverable power-belt conveyor unit—handles packages up to 150 lbs.—reaches into cars, trucks, trailers. Available in 4 sizes — 2 models.

3 with PORTABLE ROLLER CONVEYOR

— light, easy to carry and set up where needed. Standard Litewate Sectional Roller Conveyor is a great time and labor saver in loading, unloading, storing commodities. Available in 5 ft. and 10 ft. sections — straight and 90° or 45° curves.

4 with PNEUMATIC TUBE SYSTEMS

— provide swift, sure, safe transportation of messages, documents, blueprints, samples, small parts, money; cylindrical or oval tubes 1½ inch upward with dispatching and receiving terminals for complete systems to meet your needs. Write for special bulletin SPT.

Write for Standard's general Catalog AM-50. Tell us what you want to handle or name equipment on which you want more information.

STANDARD CONVEYOR COMPANY
North St. Paul 9, Minn.
Sales and Service in Principal Cities

ment. We also post the names of blood donors, safety dinner pictures, and also pictures of the bowling banquet and many items of a similar general interest.

The board to be a success must have a variety of articles posted and usually the employees will read everything posted. It must first be attractive, spacious, well lighted and conveniently located. It should be up to date at all times, have a variety of topics. Many firms do not realize that the boys like to see their names posted on the bulletin board. The bulletin board must talk in terms of employee interest to be effective.

A. E. Salmons
Philadelphia, Pa.

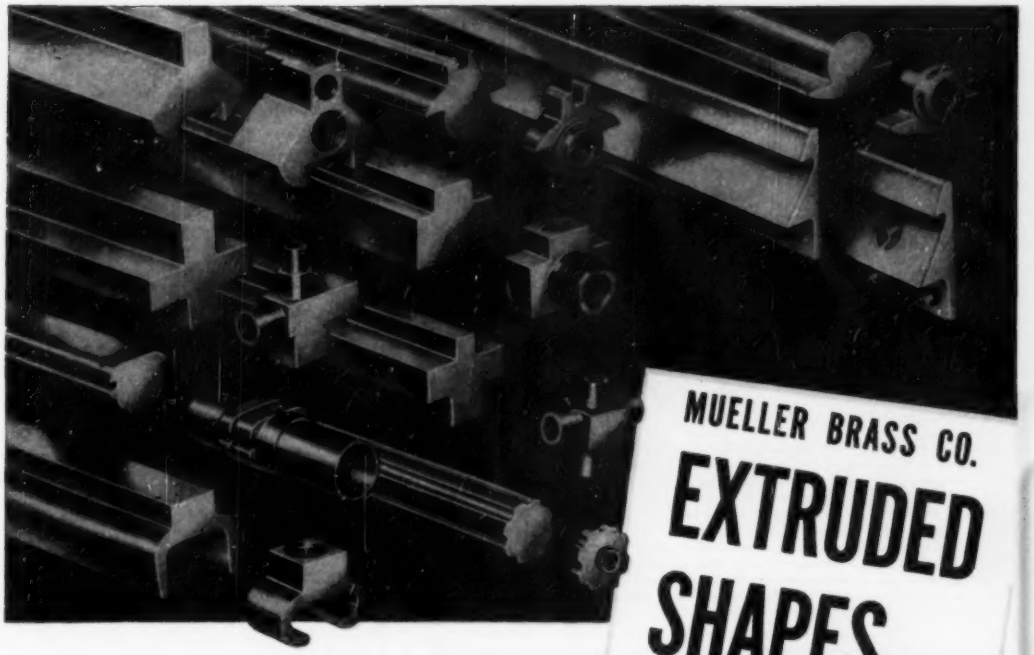
•

THE OLD-TIME bulletin board is decidedly ineffective in this day and age. Unless some high-powered thought is put into its decrepit makeup, it is due to travel the way of the Dodo. If figures could be given in terms of percentage of effectiveness it would rate at about one-tenth of one percent. I have seen single-spaced notices tacked up on a plain-framed bulletin board and after many months of exposure to the evading eyes of men it will be carried on, dirty, dusty, and curled up at the edges. Happily, this is a rare condition. However, a bulletin board is a bulletin board and as such it no longer ticks.

These are days of big things. Some atomic brain may eventually conceive of the idea of sprinkling the board's surface with insect-alluring liquid in the hopes of attracting the workers' attention as they enter and leave the plant. Eventually this will wear off—as did the application of DDT in the cow barns—and we'll be right back where we started from. Something must be done to reach the eyes or ears of the workers so that important messages from the management may reach them. The present method is pathetic—weak in the extreme. It's like putting a meal on the table and not calling men to eat.

When Bill Sloan—Bill, by the way, is the mythical representative of the thundering herd—comes through the stile, gate, or knothole, puffing contentedly on his evil-smelling comforter, he picks up his card, sticks it in its proper place, and then perfunctorily slaps down the operating lever that registers the time thereon. The meek bulletin board next to the card rack gives out with a futile sigh as Bill passes by without even a recognizing "Oh, what the hell."

Yes, something must be done to



MUELLER BRASS CO.
EXTRUDED SHAPES...

can lower your production costs!

REDUCE MACHINING OPERATIONS—LESS WASTE—The extruded shape is similar to the shape of the finished product, in some instances merely requiring a milling and drilling operation to complete the finished article.

SAVES TIME—Surfaces are extruded to precision tolerances and to a mirror-like smoothness. Less time is required for buffing and polishing in preparation for final plating.

LESS SCRAP—The sound, dense, fine-grained structure of the metal and absence of porosity result in less rejects, especially where parts must withstand internal pressure.

LONGER TOOL LIFE—Machinability is better—tools last longer and require less grinding, thus permitting steadier production runs.

A GREAT VARIETY OF SHAPES AND ALLOYS

The illustrations shown above, of extruded rods and their finished parts, are but a few of the many thousands that can be produced; but they give a general idea of the variety of shapes available.

Do you want more efficient production or better performance of your product? A specially processed rod may be the answer. If you have a problem, please tell us about it, our Technical Engineers and Laboratory are at your disposal.

YOU CAN PIN MORE PROFIT TO YOUR COST SHEET

Mueller Brass Co. Red Tip Brass Rod is a universal, many-purpose, extra-fast cutting Rod. Its constant uniformity saves tools, grinding and "down" time. It actually can be machined at greater speeds than that of which any machine is capable on a continuous production basis. YOU CAN PIN MORE PROFIT TO YOUR COST SHEET BY USING MUELLER BRASS CO. BRASS ROD AND EXTRUDED SHAPES.

MUELLER BRASS CO.

PORT HURON • MICHIGAN

New! di-acro BOX FINGER BRAKE

Four models 6" 12" 18" 24"
Capacity—16 Gauge Steel

3 TOOLS IN ONE

1. BOX and PAN BRAKE
2. STANDARD BRAKE
3. BAR FOLDER

OPEN END FINGER
for forming triangular, square and rectangular tubes.

Versatility from the word GO!! One box or 10,000—can be economically produced with the new Di-Acro Box Finger Brake. The complete box finger bar also serves perfectly for all standard brake operations. An Acute Angle Bar—quickly mounted—converts the brake to a bar folder for locks, seams, hems and sharp angles. The unique Di-Acro Open End Finger forms square or triangular tubes and other similar parts difficult to make. Real machine tool construction, with hardened and precision ground box fingers, assures permanent accuracy in producing duplicated parts. The Box Finger Bar can be easily mounted on all standard Di-Acro Brakes.

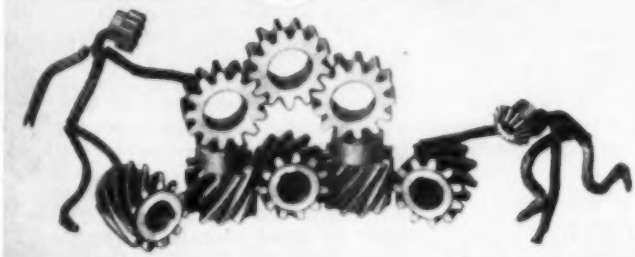
Send for
40 PAGE CATALOG
describing
DI-ACRO Shears, Punches, Benders, Brakes, Notchers and Rod Parters,—also Power Shears and Benders.

Di-Acro is pronounced "DIE-ACK-RO"

DI-ACRO PRECISION MACHINES FOR DIE LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.
311 EIGHTH AVENUE, LAKE CITY, MINN.

Mass. G&T Gear



All Types of MEDIUM AND SMALL SIZE GEARS

Mass Gear will supply your gear requirements in any quantity to meet your quality specifications.

Mass Gear has the facilities to supply you with all types of gears in medium and small sizes.

A seasoned staff of gear-producing specialists will help you design your gears and guarantee your efficient and uniform production.

If you have a gear problem, let Mass Gear help you. Write for free catalog to

MASSACHUSETTS GEAR & TOOL CO.
Woburn, Mass.

Massachusetts Gear & Tool Co.

arouse the worker from his lethargy and make him see the necessity of reading the important messages directed to him. How would it be to obstruct his path with a bulletin board that he would smack into—having a red light on it to attract his attention! I certainly am in favor of dressing up the board in some way. Whether this is done with appealing masterpieces of art, or bewitching designs that attract the eye, should be left up to the discretion of the department head. He, of all people, should know more than anybody else the likes and dislikes of his men and women.

It is a mistake to think that the mind of a mechanic is confined to the limits of cold iron and steel—he appreciates the touch of warmth now and then. If the idea of colorful babes fails to do the trick, how about a light-beam-controlled switch that would start the ball rolling as the men passed by? This could operate a recording of something like this: "Hey, Chum, take a look here; this is good." I like the idea of the pictures near the drinking fountain. The boys all like to drink while they are looking—efficiency! Yes, something radical must be done to get the boys to read. I don't know why it is but a great majority of people find it difficult to follow instructions that are printed. I find this so particularly with my boys in class.

Maybe the weakness of the bulletin board is a carry over from the workers' earlier training. Give them a funny book and they'll palaver over it as one would a toe-headed two-legged pet. Have employers got to go to the expense of installing television sets in order to convey messages to their workers or should we give the old board another final chance by having the shop foreman greet his men as they arrive: "Good morning, Bill, have you read the morning bulletin?"

John Homewood
Ontario, Calif.

■

I DO NOT BLAME Ed for being irritated about old announcements on the bulletin board.

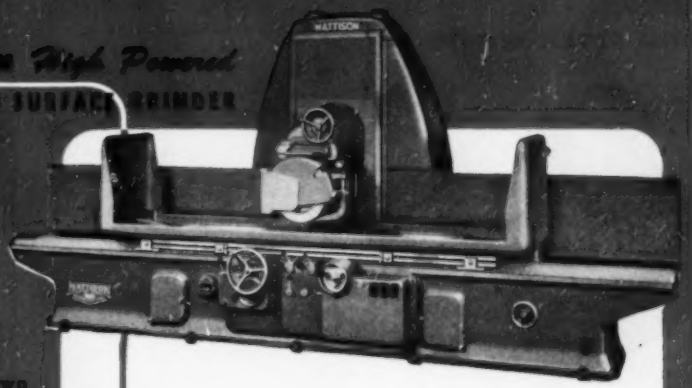
I think it is quite necessary to have one or several bulletin boards, but the announcements must be kept up to date.

Putting up safety posters on the bulletin board is perhaps not so good. They can be displayed anywhere in the shop. But there must be some place where actual messages may be posted.

Speaker systems do not make bulletin boards superfluous. One cannot reach everybody through such sys-

MATTISON GRINDERS

MATTISON *High Powered*
PRECISION SURFACE GRINDER



● Mattison Machine Works, Rockford, Illinois has purchased the line of Production Grinding Machinery formerly made by the Hanchett Manufacturing Company of Big Rapids, Michigan. These machines will supplement the well-known line of Mattison High Powered Precision Surface Grinders and enables Mattison Machine Works to offer machines for handling practically all of your Surface Grinding problems on a low cost, high-production basis.

For further information on any of the Grinders listed, ask for free circulars containing complete specifications and operating data.

MATTISON GRINDER
HANCHETT PLANO TYPE

***Grinders now built by* MATTISON**

SURFACE GRINDERS: High-Powered, Precision, Horizontal Spindle —Rotary Type, Vertical Spindle— Rotary Automatics, Vertical Spindle — Reciprocating Table Type, Vertical Spindle — Plano Type, Horizontal and Vertical Spindle.

FACE GRINDERS: Traveling Table (Hydraulic) and Traveling Wheel.

DISC GRINDERS: Single Spindle, Double Spindle, Vertical Spindle, Automatic Single Wheel.

WAY GRINDERS: Vertical Spindle for dovetails and undercuts.

ABRASIVE-BELT GRINDING AND POLISHING MACHINES for wide steel sheets, strip steel, internal tube, etc.

● For years Mattison Machine Works has successfully built High-Powered Precision Surface Grinders and will continue to build the same high quality into the entire line — through sound principles of engineering, precision manufacturing, careful workmanship and modern methods of production. Our reputation for service and careful attention to machines in the field will naturally extend over the complete line of Grinders now built by Mattison.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

toughen metal

improve surface

end stock waste

with

TORRINGTON SWAGERS

The Torrington Rotary Swaging Machine delivers 4000 hammer blows a minute...reduces, sizes, rounds, points and tapers rod, wire and tubing . . . work-hardens metal for toughness and resilience... produces a burnished surface . . . utilizes every bit of stock.

Torrington Swager performance is based on our 42 years of swaging experience. Send the coupon for your free copy of the booklet illustrating the machines and describing the art of rotary swaging.

THE TORRINGTON COMPANY
Swager Department
559 Field Street • Torrington, Conn.

For a free copy of this booklet, send the coupon today.

Please send a copy of "The Torrington Swaging Machine" to:

Name_____

Firm_____

Address_____

tems, except perhaps if all messages were read several times. That would, however, be very tiresome for those who have heard them once.

The bulletin board is a silent, dependable and effective messenger and costs very little to run. Dressed up now and then and keeping all notices up to date is necessary for attracting the people.

To increase the interest in reading bulletins perhaps the board could be illuminated with lights of different colors, each color being designated to a certain kind of news. Then each man would be attracted to the kind of bulletins he was most interested in.

Important news from the management about production, promotions, wages, discipline, safety measures, etc. could be shown in red light. Sports, social events and the like could be displayed in green light—and so on.

If the company in question has a house organ it may be used as suggested by Ed, but lots of employees won't read it. If the bulletin board is kept up to date with information about the shop, and the house organ publishes the personal things, they are both necessary.

Only one person should be responsible for the bulletin boards and instructed to keep them neat and attractive. The foremen as a rule do not have time to bother themselves with the bulletin boards.

A. E. Fristedt
Stockholm, Sweden

•

ALTERNATE DELEGATE

Is IT SOUND management to keep a man in a job he's doing well—or try him on other jobs until the job he is slated for opens up?

It is, I believe, the best policy, and better management, to move the foreman, who has proved himself efficient and may be likely top executive material, and give him various assignments around the plant so as to give him a well rounded experience, as well as the knowledge of the various types of equipment. Also a better all-around knowledge of the product manufactured. These changed assignments will make him a far more efficient man and certainly he will not be less capable or out of touch and he will be able to handle the bigger job when that job becomes available. He will be broadened tremendously by the knowledge and experience gained and be far better equipped to take over the more responsible job.

Arthur Silvester
Nantic, Conn.

Ask your **VICTOR** *distributor about*

THE NEW molyflex HIGH SPEED HAND HACK SAW BLADES

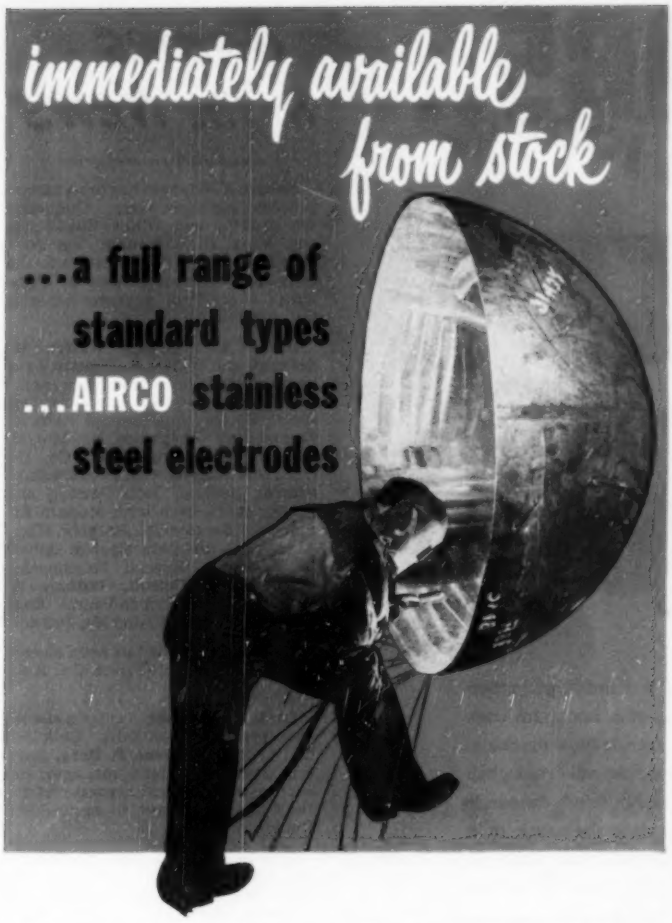
Your Victor distributor will tell you that this new "Molyflex"... when pitted against eight leading competitive blades in cutting treated SAE 52100 ball bearing steel . . . *averaged 23.8% more metal cut* than all the leading brands tested. He will tell you that this new "Molyflex" . . . an addition to the Victor line . . . has greater uniformity, is absolutely shatterproof and unbreakable when used in a frame.

VICTOR STEELRITE METAL MARKING CRAYONS

Ask your Victor distributor about the new Victor Steelrite Metal Marking Crayons. Available in a variety of sizes, these crayons are made of genuine soapstone. Special extrusion process insures uniform strength and composition. Markings can be made on hot, cold, damp or grimy metal and withstand pickling, yet do not affect enamel application.

Don't forget to ask for a free copy of the Victor Metal Cutting Booklet for your pocket or tool kit and the Victor Wall Chart for your shop. They'll help you get the maximum efficiency from your metal cutting saw blades.

VICTOR
SAW WORKS, INC., Middletown, N.Y., U.S.A.
Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades



All Airco Stainless Steel Electrodes are designed to afford extreme operational ease in all positions — vertical, overhead and horizontal. Their arc stability and deposition characteristics assure smooth, flat weld deposits. Furthermore, Airco's continuing research permits you to get special stainless steel electrodes tailored to fit any unusual requirements that might arise.

These electrodes are supplied with two types of flux coatings — the heavy extruded lime type, specifically designed for application with DC reversed polarity, and the extruded titania type for AC or DC application.

These electrodes produce a spray type arc of excellent stability. The covering which serves as a flux gives rapid wetting action and completely covers the deposit. Because of this good wetting action, it is possible to produce welds which taper into the base metal, thus eliminating abrupt changes of contour which would be conducive to slag adherence.

For more information about Airco Stainless Steel Electrodes, write your name and address on the margin below, and send it to your nearest Airco office, or authorized dealer for a copy of Catalog ADC-650B.

More news about AIRCO products

IMPROVED AIRCO NO. 78E MILD STEEL ELECTRODE

No. 78E is an improved high quality E6010 electrode. It has a very smooth spray type arc with little spatter. The deposit solidifies quickly producing very smooth horizontal fillets. It also operates exceedingly well on vertical up, vertical down and overhead welding. The mechanical properties and X-ray characteristics are excellent exceeding the requirements of the E6010 class.

This electrode is used extensively in the welding of fittings on fired or unfired pressure vessels, storage tanks, structural frames, bridges, pipe lines, and all classes of marine work where high ductility and tensile strength are essential.

AIRCO HELIWELDING EQUIPMENT

All high capacity Heliweld holders are water-cooled to provide sufficient cooling for high currents used. There's the Air-Cooled Manual Holder for light, general-purpose work . . . the Water-Cooled Manual Holder for heavier, general-purpose work . . . the Machine Holder for semi-automatic installations . . . the Automatic Head for the fully automatic operations. Also available is a Heliweld "Bumblebee" for AC heliwelding. This machine has all controls for current, gas and water within its housing, PLUS a one unit power supply.

For more information, write your nearest Airco office today for a free copy of Heliwelding Catalog No. 9.

★ ★ ★

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Calcium Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting, and arc welding . . . we'll be glad to help you.

AIRCO **AIR REDUCTION**

Offices in Principal Cities

BIG JOBS... or little jobs

Handle them speedily, economically on a WELLS No. 12 METAL CUTTING BAND SAW!

Illustrated is the Wells No. 12 with self-contained wet cutting system.

The Wells No. 12 Saw is a sturdy production tool for fast and accurate cutting at a minimum cost. It doesn't require an expert to operate this machine. Just place the stock in the quick-acting vise and push the starting buttons — the hydraulic head descends automatically, feeding the blade into the stock at a uniform rate, governed by electrically controlled, adjustable blade pressure. At the completion of the cut the head returns to a predetermined raised position and the motors shut off.

Get full details from your Wells dealer.

DESIGN DETAILS

CUT-OFF CAPACITY:	
Rectangular	12" x 16"
Rounds	12¾" O.D.
DIE BLOCK CAPACITY:	
Maximum Cutting	12¾" deep; 16" wide
Maximum Clearance, Bed to Blade	18"
SPEEDS, Selective	50, 90, 150 ft. per min.
MOTORS	½ H.P. & ¾ H.P.
WEIGHT, Approximate	1750 lbs.

Write for complete information on Wells Metal Cutting Band Saws.

Wells Saws

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICH.

Names in the News

Robert W. Graham has been named general superintendent, Duquesne Works of Carnegie-Illinois Steel Corp. and **King H. McLaurin** has been transferred from that position to the company's general offices in Pittsburgh as a special representative in the operating dept.

Harry L. Murray, Walter W. Schmitt, and **Walter R. Jackson** have been elected president, vice president, and secretary-treasurer, respectively, of the National Assn. of Engineering Companies. Mr. Murray is with Murray Engineering Co., Detroit; Mr. Schmitt with Product Engineering Service, Inc., Detroit; and Walter R. Jackson with Modern Engineering Service Co., Berkley, Mich. Three new directors elected: **Albert F. Lehmann,** Special Engineering Service Inc., Detroit; **William H. Bosserman,** Bosserman-Pearce Engineering Co., Detroit; and Mr. Jackson.

C. Heamon Castle has been elected vice president, Roto-Finish Co., Kalamazoo, Mich.

David E. Davidson has been elected vice president for sales, Link-Belt Co., Chicago. **Eugene P. Berg,** formerly assistant general manager, has been named general manager of the Pershing Road plant, to succeed Mr. Davidson.

Gareth W. Speer, New York financial and investment executive, has been named assistant treasurer of Kaiser-Frazer Corp., Willow Run, Mich. Before joining K.F Mr. Speer was assistant treasurer of Fairchild Engine & Airplane Corp.

John J. Coy

John J. Coy, has been named assistant sales manager, American Screw Co., Providence, R. I. He has been a sales representative of American Screw for 12 years, headquartered in Dayton.

Consider *Your* Savings In COLD FORGED PARTS

Do you use many parts, ordinarily produced by more expensive methods, which can be cold forged? While there are some limitations in cold forging, it is true that, in many cases, Allied has manufactured parts never before considered for this type of production.

Through engineering and production methods which Allied employs, special cold forged parts can be produced in many unusual shapes and sizes. Tolerances as close as are required for most machined parts are secured. The cold forging process invariably provides greater strength and durability in the parts produced. Of most importance, in high volume production, your part costs can be reduced materially.

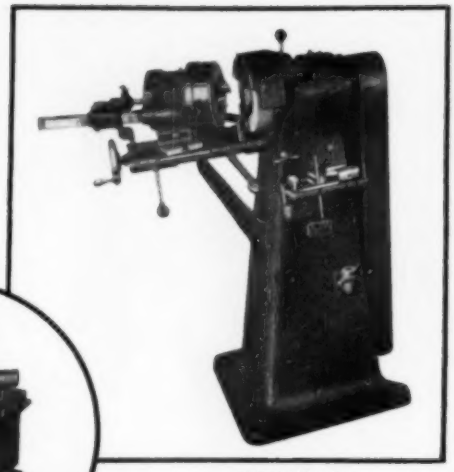
Don't pass up the possibility of your parts being produced more economically. Send your part prints to learn what Allied can do for you.

PRECISION • EXPERIENCE • ALLIED CORPORATION PRODUCTS • DEPENDABILITY

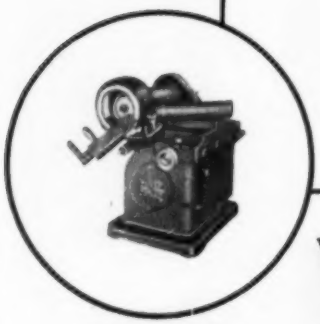
ALLIED PRODUCTS CORPORATION
DEPARTMENT 33
12605 BURT ROAD • DETROIT 23, MICHIGAN

HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS
SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

OLIVER OF ADRIAN



Model No. 21



Model No. 510

YOU

CAN DO IT WITH AN OLIVER DRILL POINTER

- Reduce drill grinding costs.
- Increase drill grinding speed.
- Get uniform performance.
- Eliminate the human chance for error.
- Reduce operator's fatigue.
- Have full automatic operation.
- Grind scientifically correct and theoretically perfect drill points.
- Save money.

No. 510 Oliver Drillpointer for pointing drills ¼" to 3" in diameter, equally accurate on 2, 3 or 4 flute drills. . . . It provides variable point angles and variable clearances and a free cutting drill point.

No. 21 Oliver Drillpointer hand operated bench machine, designed for grinding small drills No. 57 to ½", grinds any standard and many special drill points. Quick to set up; easy to operate; well designed; compact.

NO COST TO YOU

Send us a few of your drills to point on the Oliver Drillpointer, then put them in operation in your plant and judge the results for yourself.

OLIVER INSTRUMENT CO.

1414 E. MAUMEE • ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDERS · TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—REMAKING MACHINES

A. J. McDonald

A. J. McDonald, vice president, American Steel Foundries, Chicago, was the 1949 winner of the Lorenz Memorial Gold Medal, awarded by Steel Founders' Society of America for distinguished service to the steel casting industry. The Society's Technical and Operating Medal for 1949 was awarded to **John F. Lacey,** works manager, Commercial Steel Casting Co., Marion, Ohio. The Society re-elected **Thomas H. Shartle** president, and elected as vice president **J. E. Mullen,** vice president, National Erie Corp., Erie, Pa. **G. Rhoads Casey** president and general manager, Treadwill Engineering Co., Easton, Pa., was elected national director and member of the executive committee.

Earl D. Power has been named chairman, Lyon Metal Products, San Francisco, succeeding **B. I. Water. H. B. Spackman,** executive vice president since 1946, was elected to succeed Mr. Power as persident.

Graham Marks has been named general manager, Caine Steel Co. of California, at Los Angeles.

Robert W. Purcell and **Max J. Zivian** have been elected to the board of Portsmouth Steel Corp., Cleveland. Mr. Purcell is vice chairman of Alleghany Corp. which owns some 50,000 shares of Portsmouth common stock. Mr. Zivian is president, Detroit Steel Corp., in which Portsmouth has a large interest.

H. F. Lefferty has been named Pacific Coast sales manager, Babcock & Wilcox Tube Co., succeeding **H. P. Curtis,** resigned. His headquarters will be in Los Angeles. He was district sales manager at the Chicago office.

Charles B. Belknap of Owens-Illinois Glass Co. has been elected director of Arthur D. Little, Inc., Cambridge, Mass. **Howard J. Billings** was elected treasurer to succeed **Henry G. Powning.**

Dr. James T. Eaton has been named director of research, E. F. Houghton & Co., Philadelphia.

LOW COST — HIGH PRODUCTION

HARTFORD Special

Automatic Thread Roller

This Automatic Thread Roller is designed to solve standard and special thread rolling problems on small size screws from .086" to .190" in diameter with thread length capacity from ⅛" to 1½", rolling consistently to Class 3 Thread Fit. Careful engineering and rugged construction make it capable of continued high production runs with startling economy.

The "Hartford Special" Automatic Thread Roller incorporates such outstanding features as Completely Automatic Feed, Filtered Lubrication System, "Table Top" Working Level, Vibration-Free Operation, plus many more.

Our engineering staff is always available to help you work out your thread rolling problems. Write now for complete information.

HARTFORD Special

Automatic Drilling and Tapping Machinery • Swaging Machines
Die Polishing Machines • Contract Machine Work • Gears • Cams
"Super-Spacers" • "Four-Point" Milling Vises • "V-Block" Milling Fixtures

THE HARTFORD SPECIAL MACHINERY CO.
287 Homestead Ave., Hartford 5, Conn.

Please send me free Bulletin TR-100 describing your Automatic Thread Roller.

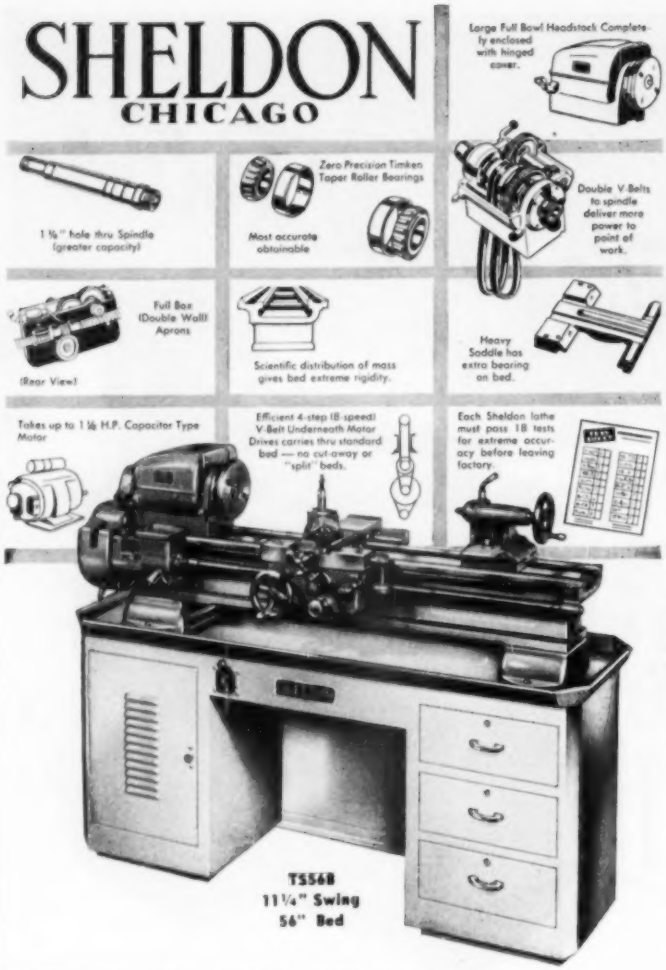
Name _____ Pos. _____

Company _____

Address _____

City _____ Zone _____ State _____

SHELDON
CHICAGO


Large Full Bowl Headstock Completely enclosed with hinged cover.
1 ⅝" hole thru Spindle (greater capacity)
Zero Precision Timken Taper Roller Bearings
Most accurate obtainable
Double V-Belts to spindle deliver more power to point of work.
Full Box (Double Wall) Aprons
(Rear View)
Scientific distribution of mass gives bed extreme rigidity.
Heavy Saddle has extra bearing on bed.
Takes up to 1 ½ H.P. Capacitor Type Motor
Efficient 4-step (8-speed) V-Belt Underneath Motor Drives carries thru standard bed — no cut-away or "split" beds.
Each Sheldon lathe must pass 18 tests for extreme accuracy before leaving factory.
T556B
11¼" Swing
56" Bed

More Earning Power Per Dollar of Tool Cost

In its 9", 10", 11", and 13" Precision Lathes, Sheldon has produced small, moderate priced lathes with "big lathe" accuracy and productive capacity. These space saving, power saving, easy to operate, precision lathes, will work to the closest tool room tolerances, or deliver more pieces per hour and more pieces per dollar on a production run.

Increase your shop's earning power by replacing slow, cumbersome, old style equipment with batteries of these light, fast, modern tools.

Write for Catalog

SHELDON MACHINE CO. INC.

4234 N. KNOX AVE. **CHICAGO 41, ILL.**

Leo B. Glaser

Leo B. Glaser has been named manager of the newly formed Neg'ator Div., Hunter Spring Co., Lansdale, Pa. He assumes responsibilities for supervision of all activities concerned with production, design and development of the Neg'ator, the new elastic member which has negative or constant force-deflection characteristics.

James D. Cunningham, president, Republic Flow Meters Co., Chicago, will be awarded the Chicago Technical Societies Council 1950 merit award for "outstanding engineering, administrative, and civic service." He is president of American Society of Mechancial Engineers.

Roy D. Haworth, Jr., has been named manager of product development, Carbide Alloys Div., Allegheny Ludlum Steel Corp., Pittsburgh. Previously he was with Armour Research Foundation, Chicago, as supervisor of abrasion research. Los Angeles changes: **Richard J. Swan** was transferred from Dayton to become area manager; **Jerome E. Turk** was made assistant district sales manager; and **R. P. Stemmler** was named manager of the forge plant, to succeed **M. F. Findley,** retired.

Russel Wagner has been named general manager, Haines Designed Products Corp., Dayton, Ohio, a new firm. He was with Aeroproducts Div., General Motors Corp., Vandalia, Ohio.

John N. Marshall and **E. L. Clair** have been elected to the board of directors, American Iron & Steel Institute. Mr. Marshall is chairman of Granite City Steel Co., Granite City, Ill. Mr. Clair is president, Interlake Iron Corp., Cleveland.

J. V. Naish, director of contracts for Consolidated Vultee Aircraft Corp., San Diego, has been given the added assignment of director of sales.

J. C. Poole, assistant purchasing agent, Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, has been named director of purchases. He is also assistant secretary of the company.

for the PRODUCT DESIGNER . . .

an IMPORTANT NEW ADDITION

"100" Series Ground Deep Groove Radial, Full Ball Type, Soft Outer Band, Inch Sizes.

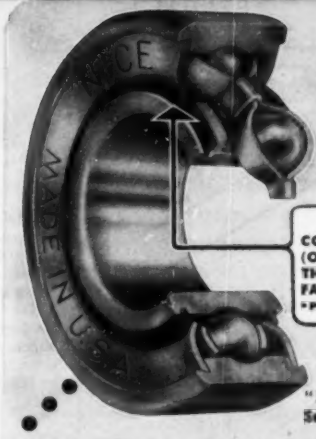
"400" Series Unground Deep Groove Radial, Full Ball Type, Soft Outer Band, Inch Sizes.

"1200" Series, Similar to "400" Series Except Double Row.

"K" Series (Aircraft and Commercial) Precision Deep Groove Radial, Full Ball Type, Double Shielded, Inch Sizes.

Ground Thrusts, Series "1000" "1100", "2600" and "2700", with Retainer, Inch and Metric Sizes.

"600" Series Self Contained Unground Thrust, Full Ball Type, Soft Outer Band, Inch Sizes.



NEW!
COMPOSITION SEAL* (OIL RESISTANT SYNTHETIC RUBBER COATED FABRIC)
*PATENT APPLIED FOR

"1600" and "3000" Series Composition Sealed

to the NICE LINE

"1600" and "3000" Series Shielded or Open

Available as illustrated, Series "1600" Low Cost Precision Radial Bearings and Series "3000" Unground "Precision Type" Radials, Metal Shielded or Open, or with COMPOSITION SEALS. Solid Race and Cone with Retainer, Inch Sizes.

"500" Series Unground Radial and Thrust, Full Ball Type, Pressed Cone, Soft Outer Band, Inch Sizes.

"700" Series Unground Radial and Thrust, Full Ball Type, Solid Cone, Soft Outer Band, Inch Sizes.

"Flanged" Series, Similar to "400" Series Except Outer Band Flanged.

"Flanged" Series, Similar to "400" Series Except Felt Sealed and Outer Band Flanged.

For complete information on the NICE Line write for New Catalog No. 140

NICE

NICE BALL BEARING COMPANY
NICETOWN PHILADELPHIA PENNSYLVANIA

Threadwell Tools do many jobs

they can do your tough ones

For the answer you've been looking for, call in your nearest Threadwell Distributor. You can get his name as well as complete information by mailing the coupon below.

THREADWELL TAP & DIE CO., Greenfield, Mass.

Send me free Bulletins checked below

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Company _____

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Threadwell

Taps ☐ Dies ☐ Drills ☐ Counterbores ☐ Keyway Broaches ☐ Gages ☐

Roger M. Kyes

Roger M. Kyes, assistant general manager, GMC Truck & Coach Div., General Motors Corp., has been named general manager, succeeding **Morgan D. Douglas,** on leave of absence because of health. Prior to joining GM in 1948, Mr. Kyes was successively assistant to the president, Glenn L. Martin Co.; assistant to the vice president, Black & Decker Mfg. Co.; vice president, Empire Plow Co., Cleveland, and president and general manager, Harry Ferguson Inc.

Keith E. Carter, Thomas R. Corn, Ralph I. Coryell, Warner Jennings, William C. Mitchell, and **H. Norris Robinson** have been named by Reliance Electric and Engineering Co., Cleveland, to be sales application engineers in the following offices, respectively: Pittsburgh, Cleveland, Syracuse, Detroit, Philadelphia, and New York. **Robert O. Gee** has been asisgned to the applied engineering dept. in the company's home office.

Byron E. Snow has been named sales engineer in the Chicago territory of Aeroquip Corp., Jackson, Mich. His territory embraces Illinois, Iowa, and southeastern Wisconsin. His headquarters will be 380 Elizabeth Drive, Lombard, Ill.

Thomas L. Coatney has been named general sales manager, Frederick Post Co., Chicago. He served as general manager of the company's southwestern division, in Houston, where he has been succeeded by **Arthur C. Morales,** former assistant manager.

Robert H. Brown, chief of chemical metallurgy at Aluminum Co. of America's research laboratories in New Kensington, Pa., has been named by National Assn. of Corrosive Engineers to receive the Whitney Award for 1950 "in recognition of his outstanding contributions to the science of corrosion."

Howard B. Speyer has been named vice president and **T. A. Hill** named secretary of Champion Spark Plug Co., Toledo.

If you need

PRECISION GROUND SURFACES

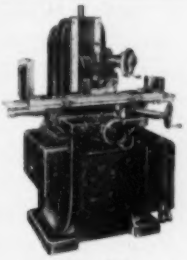
See the complete line of Grand Rapids Grinders

Tool room types — production types

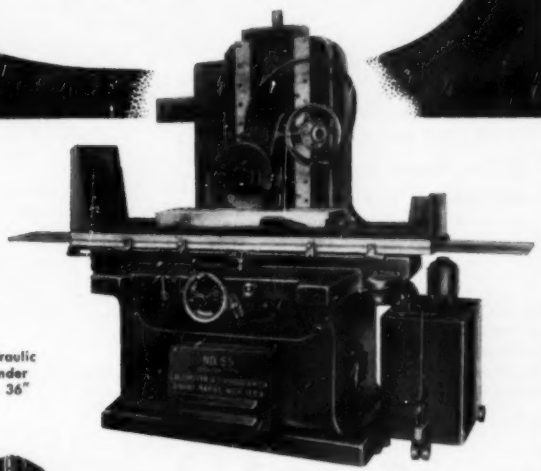
In small job shops and in America's largest industrial plants, more and more Grand Rapids Grinders are delivering tool room accuracy with micro-inch finish at production speeds. Your inquiry about surface grinders or cutter grinders, tap grinders, drill grinders or combinations, will receive prompt attention.

GALLMEYER & LIVINGSTON CO.
330 Straight Ave., Grand Rapids, Mich.

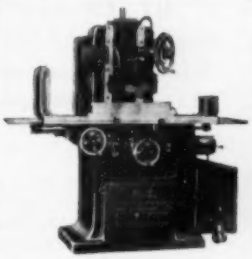
No. 20
Grand Rapids Hand Feed Surface Grinder
Size 6" x 10" x 18"



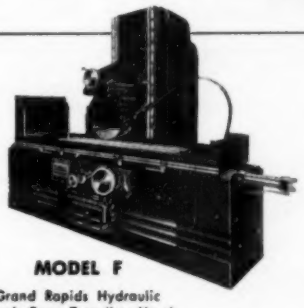
No. 25
Grand Rapids Hydraulic Feed Surface Grinder
Size 6" x 10" x 18"



No. 55
Grand Rapids Hydraulic Feed Surface Grinder
Size 12" x 17" x 36"

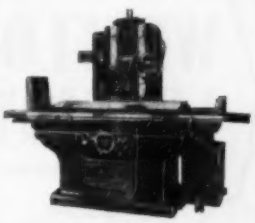


No. 35
Grand Rapids Hydraulic Feed Surface Grinder
Size 8" x 12" x 24"



MODEL F
Grand Rapids Hydraulic Feed, Cross Traveling Head Surface Grinder
Size 16" x 25" x 48" to 24" x 25" x 96"

GRAND RAPIDS GRINDERS



No. 65
Grand Rapids Hydraulic Feed Surface Grinder
Size 12" x 17" x 48"

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS.

HY-TEN Alloy Steels are steels with their own specific properties and definitely different chemistry from standard AISI and SAE steels. They are *not* AISI or SAE steels to which a trade name has been attached.

HY-TEN Steels offer the advantages of the latest metallurgical improvements before they are incorporated in the standard groups. The HY-TEN of today is the standard steel of tomorrow.

HY-TEN is a guarantee of uniform chemistry, grain size, hardenability, etc.

HY-TEN *and* STANDARD AISI and SAE Steels are stocked in a wide variety of sizes, shapes, treatments and finishes, thus assuring prompt reliable steel service from WL's seven warehouses.

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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HY-TEN *and* AISI

Chester W. Schweers and **Frank R. Freyler** have been named managers of the New England and Mid-Atlantic regions, respectively, Allis-Chalmers, Milwaukee. Mr. Schweers was manager of the Los Angeles district. He will make his headquarters in Boston, succeeding **W. F. Taylor**, resigned. Mr. Freyler was Philadelphia district manager. He succeeds **William Arthur**, retired, and will continue to have his headquarters in Philadelphia. **Arthur D. Brown**, manager of the Washington, D. C. office, succeeds Mr. Freyler as manager at Philadelphia. **R. N. Landreth** is the manager in the Washington office.

Joseph A. Cappi has been elected vice president, Electric Auto-Lite Co., Toledo. He will serve in the production division. During the war, Mr. Cappi was plant manager of the Metals Manufacturing Div. of the company, Long Island City, N. Y. Following the war he was made plant manager of the Buckeye Bumper Div., Springfield, Ohio.

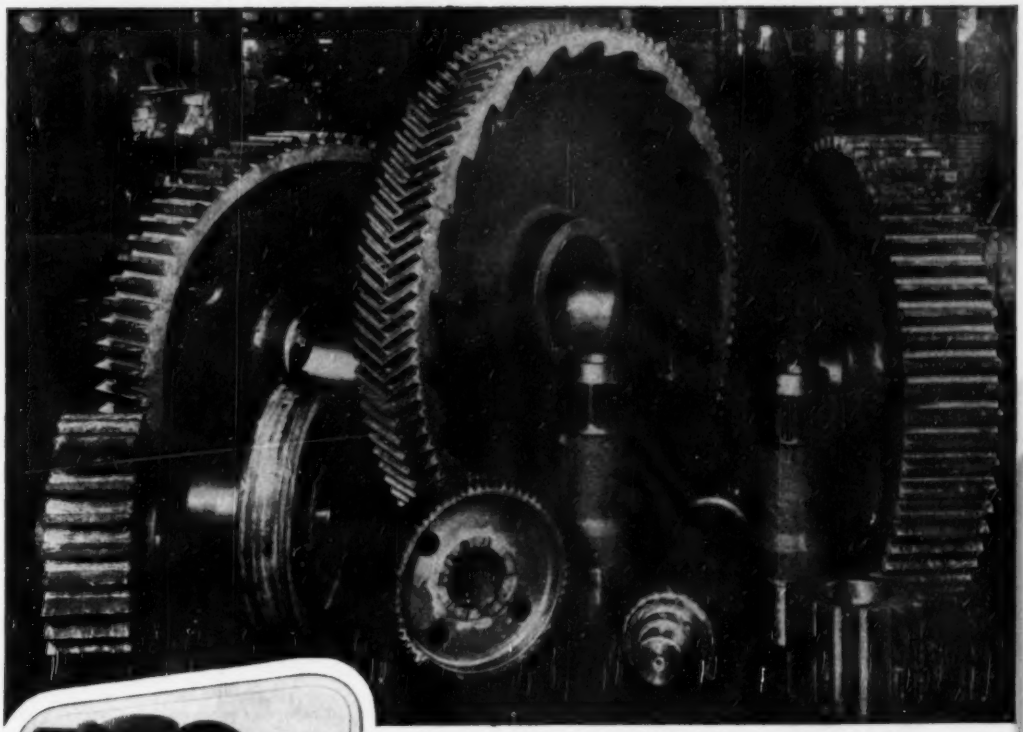
Business Items

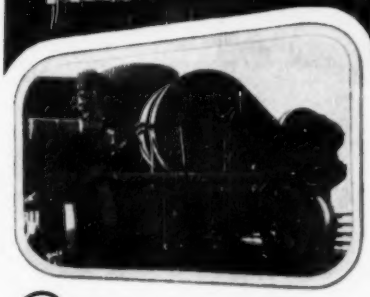
Borg-Warner Corp., Chicago, will transfer later this year all manufacturing and administrative activities of the Marvel-Schebler Carburetor Div., now located in Flint, Mich., to Decatur, Ill., to be housed in a 135,000-sq ft plant. Negotiations are in progress for sale of the Flint plant to E. I. DuPont de Nemours & Co.

Southeastern Metals Co., Decatur, Ala., is locating a new plant in Birmingham to manufacture steel tubing. The new plant will employ about 200 persons and expects to start installation of machinery in the former Alabama Foundry building in the near future. Thomas E. Bowen will be manager.

Bendix Aviation Corp. has completed a new factory in North Hollywood, Calif., to make master cylinders for automobile brake systems and for hydraulic equipment in agricultural machinery. Machinery investment was $500,000, with each machine individually modified to do its work on particular parts. Machines are also incorporated in a continuous-flow production line.

Farrel-Birmingham Co., Inc., has moved to its main offices at Ansonia, Conn., the gear sales division which has been located at the company's Buffalo plant and the marine sales division presently connected with the New York office. Sale of gear generating machines and gear cutting tools will continue at Buffalo, as will the engineering and manufacturing departments. The export sales department remains in the company's office in the Chrysler Bldg., New York.





CRANE GEARS and TRACK WHEELS have *Greater Internal Stress Value* . . .

HERE IS WHY

FOR COMPARATIVE PURPOSES

we tabulate below the physical properties of the surface and core values of SAE-1020, SAE-2315, Steels, Carburized or Case Hardened with "NELOY" and "NELOY-MOLY" Steels Normalized or Liquid Quenched, Finish Machined and Flame Hardened.

	Ultimate Tensile Lbs. per Sq. In.	Elastic Limit or Yield Point Lbs. per Sq. In.	Elongation Percent	Reduction of Area Percent	Brinell	Scleroscope
S.A.E. 1020 Case Hardened (Surface)	260/300,000	180/195,000	5-10	8-12	514-601	71-81
S.A.E. 1020 Case Hardened (Core)	60/ 70,000	30/ 35,000	30-35	40-50	120-140	17-20
Neloy Annealed and Flame Hardened Treatment 10B (Surface)	218/270,000	190/240,000	8-12	20-35	477-590	66-80
Neloy Annealed and Flame Hardened Treatment 10B (Core)	85/ 90,000	56/ 65,000	23-40	30-40	163-170	24-24
S.A.E. 1020 Case Hardened (Surface)	260/300,000	180/195,000	5-10	8-12	514-601	71-81
S.A.E. 1020 Case Hardened (Core)	60/ 70,000	30/ 35,000	30-35	40-50	120-140	17-20
Neloy Heat-treatments No. 3 and 10B (Surface)	228/270,000	200/240,000	8-12	20-35	550-590	68-80
Neloy Heat-treatments No. 3 and 10B (Core)	100/110,000	90/ 90,000	20-26	40-50	202-240	29-33
S.A.E. 2315 Case Hardened (Surface)	290/329,000	185/205,000	4-8	6-10	570-653	78-87
S.A.E. 2315 Case Hardened (Core)	112/129,000	99/120,000	12-20	38-51	249-275	35-39
Neloy-Molybdenum, Normalized, Drawn and Flame Hardened (Surface)	258/281,000	212/247,000	6-10	8-12	514-555	71-75
Neloy-Molybdenum, Normalized, Drawn and Flame Hardened (Core)	90/110,000	65/ 85,000	18-25	30-40	190-220	28-33
S.A.E. 2315 Case Hardened (Surface)	290/329,000	185/205,000	4-8	6-10	570-653	78-87
S.A.E. 2315 Case Hardened (Core)	112/129,000	99/120,000	12-20	38-51	249-275	35-39
Neloy-Molybdenum Heat-treatments 3A and 10B Flame Hardened (Surface)	282/318,000	217/265,000	4-8	6-10	555-627	75-84
Neloy-Molybdenum Heat-treatments 3A and 10B Flame Hardened (Core)	132/150,000	120/135,000	10-18	25-35	290-320	41-45

*The variation in tensile and yield in the third table is due to the alloyed elements of 2315 which is a nickel steel. This produces a higher physical on a straight annealed steel compared with more economical alloy used in Neloy Moly.

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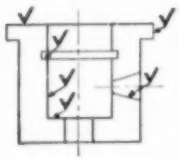
You Get ALL THREE with the PROFILOMETER

A Shop Tool for Microinch Roughness Measurement

***DEPENDABILITY:** The Profilometer is as dependable as a dial gage—eliminates uncertainties and errors common to "human" inspection methods. For any given path of trace, it always gives the same reading, directly in microinch units—today, tomorrow, or next year—no matter who is using it.

***SPEED:** The Profilometer is 8 to 25 times as fast as any other instrument of its type. And in the time required to compare a surface with roughness specimens, you can take *several* Profilometer readings. This speed of measurement lets you detect changes in roughness in time to correct production operations and prevent work spoilage.

***VERSATILITY:** The Profilometer measures practically all surfaces produced by machining, grinding or finishing operations—internal or external—straight, tapered, or circular—over any desired length of trace. With many surfaces, it provides the ONLY means for getting a roughness rating.



IN ADDITION, the Profilometer is rugged, portable, and simple to operate—*designed especially for shop use.*

ILLUSTRATED BULLETIN gives full details—shows many applications. Write for Bulletin L-6—and *arrange for a Profilometer demonstration in your plant.*

Profilometer is a registered trade name.

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Instrument Manufacturers

ANN ARBOR 4 • MICHIGAN

DeVilbiss Co., Toledo, will construct a modern new building adjoining the Toledo plant for expansion and improvement of present facilities for customer services.

Vic Pastushin Industries, Inc., Los Angeles, has added 12,000 sq ft to its plant to accommodate facilities for production of aviation jettison tanks. The company recently signed an $850,000 government contract for the tanks which will be installed in F-80 jet fighters.

Western Steel & Wire Co., San Francisco, expects completion of its new plant at 1410 Egbert Way by May. The $56,000 facility will increase by 50% to 14,000 sq ft the company's production space.

Voi-Shan Mfg. Co., Culver City, Calif., is building a 12,000-sq ft plant at a new location in the city. The structure will cost $80,000. An additional $20,000 will be spent for machinery installation. Largest equipment purchase is a $26,000 cold header, now waiting delivery.

Hope Metal Products, Inc., Cleveland, has been incorporated to succeed Hope Metal Products Co. The firm will build or buy a new plant and install new equipment in the next six months. I. H. Hope is president and M. I. Hope is vice president, with Bob Hope a director. The company produces sheet metal products, metal cabinets, bins, shelving, partitions and specialized equipment.

Romos Enterprises, a Cincinnati syndicate, has purchased controlling interest in the Israel Brothers Co., steel fabricators and scrap metal material dealers in Dayton.

Nineteen Hundred Corp., St. Joseph, Mich., has established a new and extensive press department to bring under its own control the forming of metal parts which were being produced on the outside. Seven new H-P-M hydraulic metal drawing presses were installed for handling the deep draw operations.

American Brake Shoe Co., New York, has consolidated all operations of its Canadian subsidiaries into one corporation, the Dominion Brake Shoe Co., Ltd., a wholly owned subsidiary. Operating assets and business of Joliette Steel Ltd. and Ramapo of Canada, Ltd. were acquired by Dominion. Main office is at 1405 Peel St., Montreal.

Lockheed Aircraft Co., Burbank, Calif., has purchased facilities of the west coast division of Airborne Instruments Laboratories. Lockheed incorporated the acquisition, which includes a test range and several pieces of specialized antenna research equipment, into its transonic research dept. of engineering as an antenna research group.

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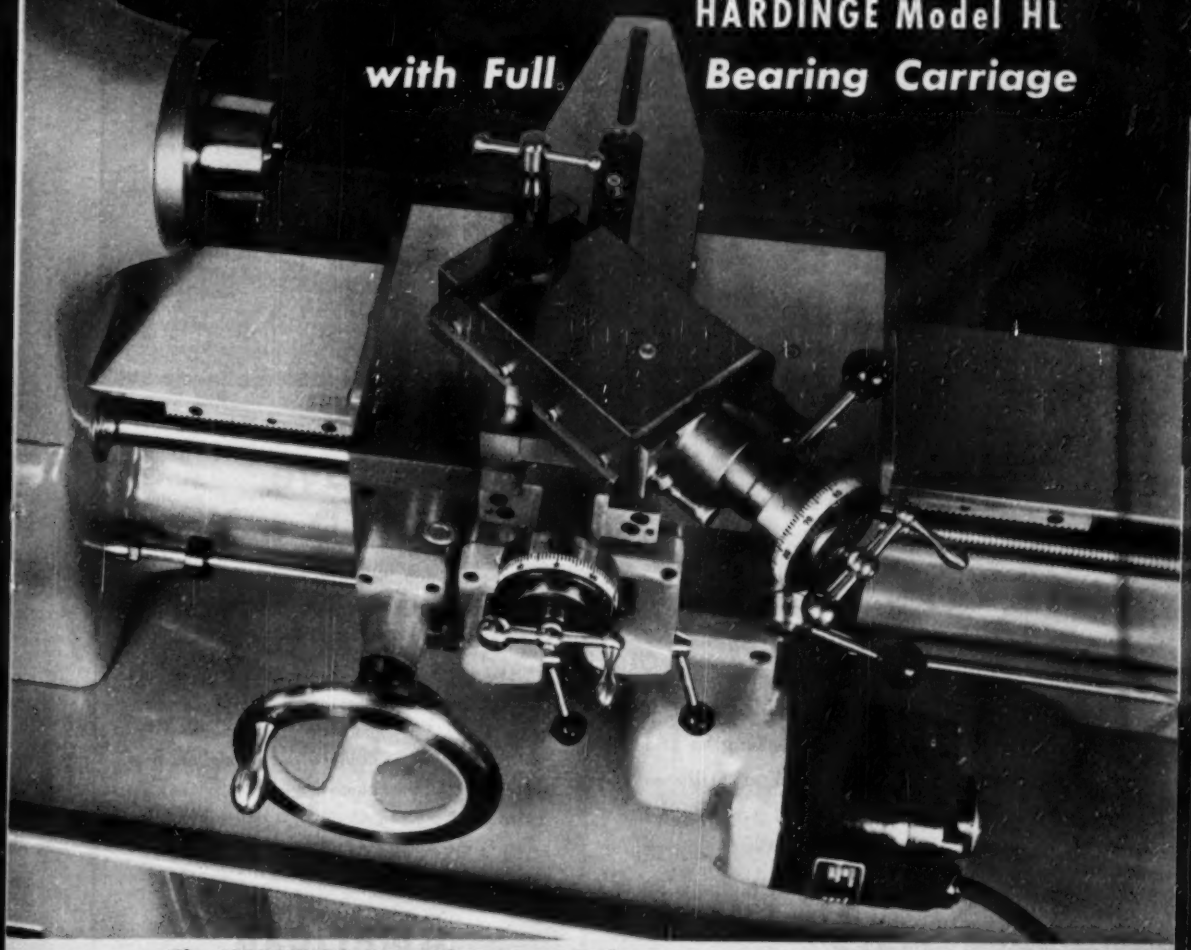
ELMIRA, N.Y.

Revolutionary Development

New **LATHE CONSTRUCTION**

HARDINGE Model HL

with Full Bearing Carriage



The* HARDINGE *General Purpose Lathe
with Full Bearing Carriage features:

- Solid Steel Hardened and Ground Bed Ways
- Full Bearing on Top of Bed
- Full Bearing on Side Dovetails
- Sustained Accuracy and Absolute Rigidity

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ELMIRA, N.Y.
1890 - 1950

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TAPERED END MILLS

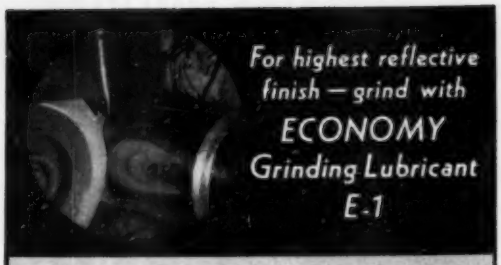
CONSTANT SPIRAL

(Die Sinking Cutters)

● The extensive line of the well known Weldon End Mills includes Tapered End Mills, Constant Spiral. Also known as Die Sinking Cutters, these new end mills, filling a definite need, come in a wide range of sizes, giving a choice of many lengths and diameters. Weldon Tapered End Mills as standard stock items are all 3-flute, and offer a choice of ½°, 1°, 2°, 3°, 5° and 7° angles. They represent the same high quality for which all Weldon End Mills are famous.

Write for Folder TM-1 giving complete list of sizes.

THE WELDON TOOL CO.
Cleveland 4, Ohio
3000 WOODHILL ROAD



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ECONOMY
Grinding Lubricant
E-1

. . . . the original paste-form grinding compound. Rigid quality control and most advanced production methods make E-1 better than ever.

. . . . . effective in hard and soft waters

. . . . . low operational cost

Write for full information on Economy Grinding and Cutting Lubricants

ECONOMY

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Original Producers of Grinding Lubricant

How to Save $1250 a Year

In the average metalworking plant, a ten per cent reduction in accidents per year for each 100 employees means a saving of $1250 a year!

"How to Operate a Safety Program" will tell you how such savings can be made quickly and economically. This eight-page Special Editorial Report concentrates particularly on helping you prevent the accidents caused by carelessness . . . source of 85 per cent of all industrial mishaps. Reprints in any useful quantity are available at 15 cents each. Write to . . .

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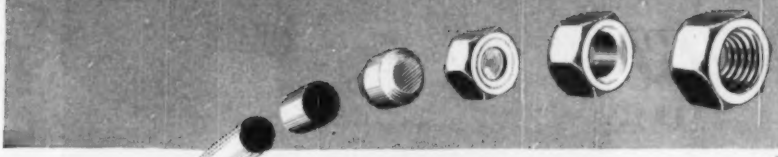
Scrapless Nut Wire

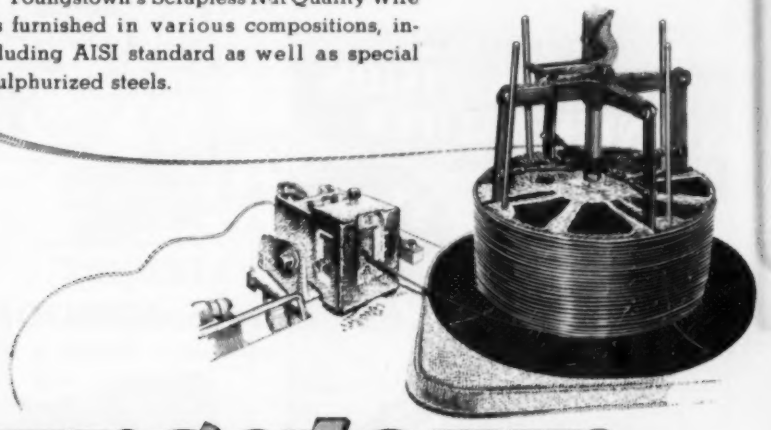
custom built to meet customers' requirements



SCRAPLESS Nut Quality Wire is not an ordinary steel for common applications. It is a custom built product designed to meet customers' specific requirements for cold heading, cold punching, cold expanding and threading, in the production of a variety of nut shapes on continuous heading machines.

Every step of its manufacture is carefully controlled--from the melting furnaces to the final drawing operation on the wire machines. Each coil of wire is subjected to close inspection and rigid tests with modern electrical testing apparatus.

Youngstown's Scrapless Nut Quality Wire is furnished in various compositions, including AISI standard as well as special sulphurized steels.



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Youngstown STEEL WIRE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

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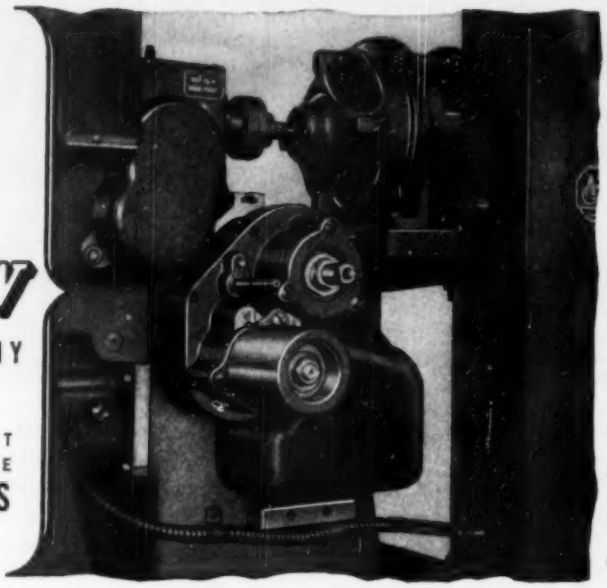

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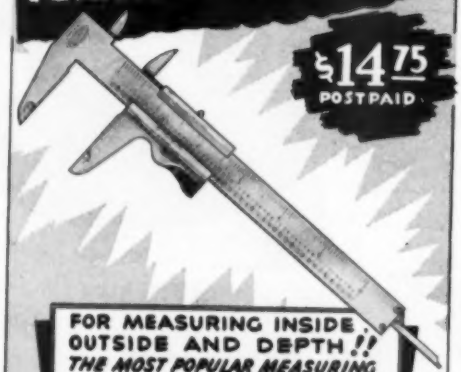

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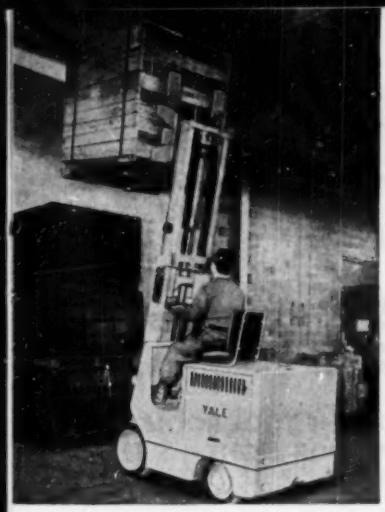

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The Yale line of material handling machinery is so complete and diversified that selection for specific requirements is easy. Whether you need hand or electric hoists, hand lift or power trucks or scales, Yale representatives throughout the nation and the world will gladly help you find ways to break production bottlenecks, save time and effort and cut handling costs.

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From the *American Machinist* Library of *Tips for Top Shop Men*

IF your plant is still departmentalized, study the advantages of straight-line rearrangement. Handling is usually too expensive nowadays to justify the luxury of having each type of machine tool segregated. The same goes for heat treating, cleaning and assembly.

BE sure you are modernizing a *job*, not just a machine. A new piece of equipment never gets a fair chance if units ahead and after it are still ancient klonkers and if feeding and workhandling devices are inadequate.

How to make planned assembly savings pay off

SAVING 25%—STRONGER FASTENINGS. Durant Mfg. Co. uses several P-K products to advantage in their Productimeter. Four Type F Self-tapping Screws fasten the mounting plate to the cover frame, two Phillips Recessed Head P-K Type Z Screws fasten the cover to counter frame, and another fastens the spring to the counter arm. The manufacturer says, "Only with P-K Screws could we get the simpler, speedier, stronger fastenings we wanted." Wing Nut on end and Set Screw in arm are also P-K. Find out how you can make similar savings. Talk to a P-K Assembly Engineer.

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(Also made with Phillips head)

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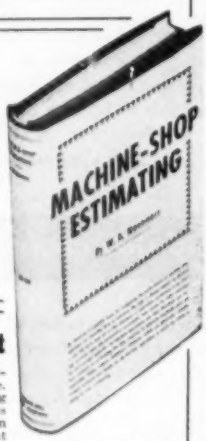

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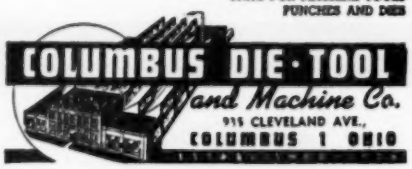

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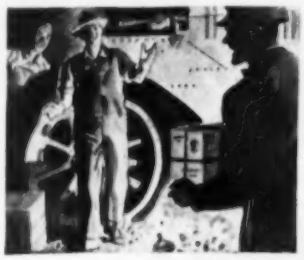

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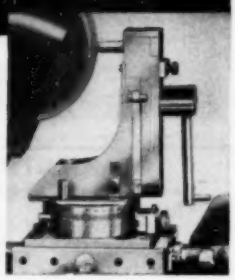

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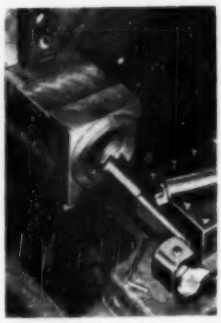

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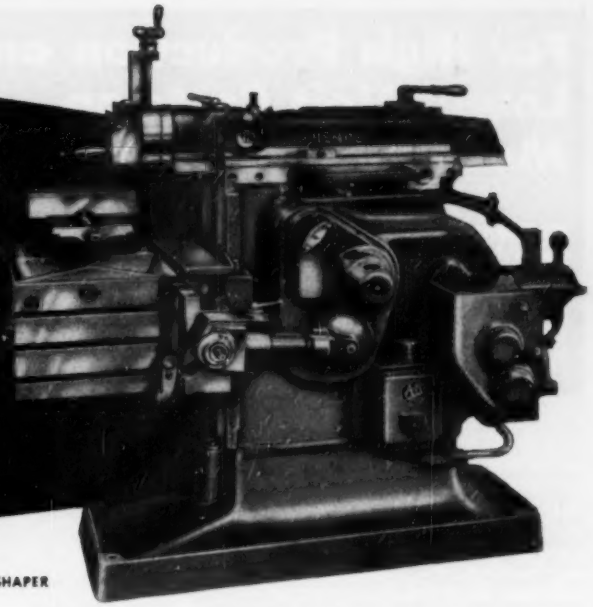
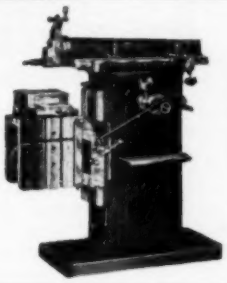


1950
12" UNIVERSAL CRANK SHAPER

A comparison of the old Hendey Friction Shaper with the NEW Hendey 12" Universal Crank Shaper will instantly reveal the profit possibilities that you may be missing. The modern Hendey Shaper offers the most complete, up-to-date shaper available today. Full standard equipment means that there are no "extras" to buy. This equipment *includes* table and vise for positioning and indexing work to any angle—flanged mounted motor—mechanical controls on *both sides*—fully automatic lubrication—quick change swivel head—adjustable, preloaded Timken bearings on the bull gear. The 12" Hendey covers a range which makes it ideal for tool room and production work. Hendey Shapers are also available with capacities from 16" to 28", both standard and heavy duty. Write for full details on the modern Hendey Shapers.



1920

Still using old 15" Hendey friction drive shapers? They have only 2 speeds, 21 and 30½ strokes per min., as against 8 speeds from 14—200 for the new 12" shaper. Surveys prove that the new 12" Universal High Speed Crank Shaper covers a majority of all jobs in most plants. Mechanical changes are almost too numerous to mention—improved accuracy, speed and profits on the new 12" shaper will easily convince you of the advisability of changing *now*!

Continuous, advanced engineering by Hendey is worth watching—and must be watched if you are to earn full profits from your lathes and shapers. For complete particulars and prices, contact your nearest Hendey office.

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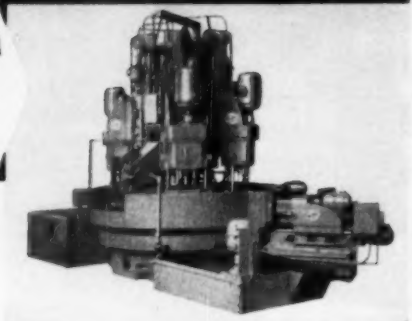

Here's a good example of the application of standard machine units to a special production job. Drilling and reaming operations of suspension support holes are performed on both right-hand and left-hand parts simultaneously. Drilling and reaming king pin holes is also included. Six stations, five operating and one loading, handle all operations with a total of 16 spindles. Machines of this type can be furnished from standard basic units for special applications on most all metalworking operations.

For Combined Operations or Single Purpose Machines

Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. An indexing table with ROTO-MATIC POWER HEADS is easily arranged to suit special machining operations.

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This machine is a good representative of the applications of D. & T. Roto-matic mechanical power heads. Six heads are used, three vertical and three horizontal. These new power heads lower maintenance costs through elimination of excessive servicing.

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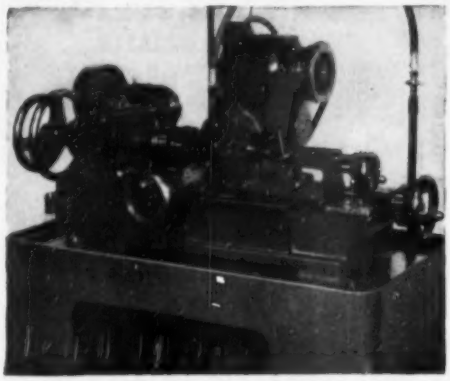

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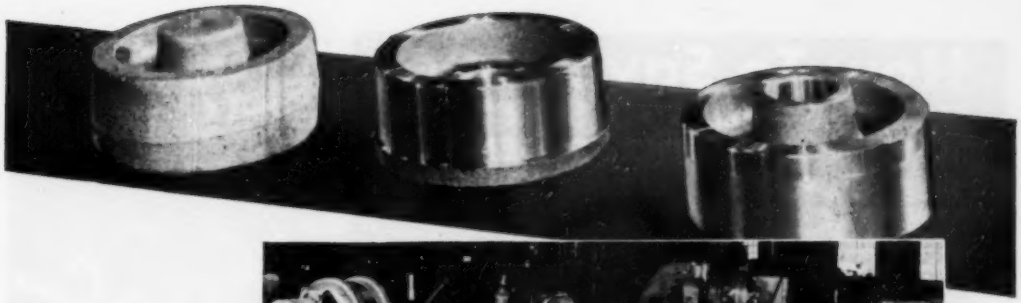

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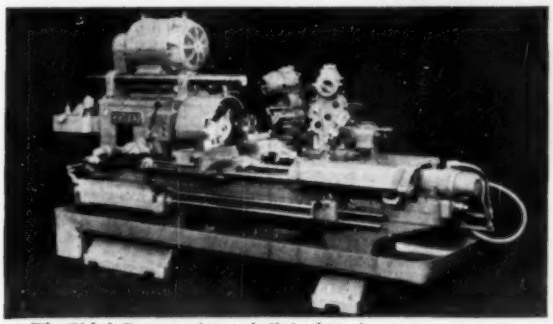


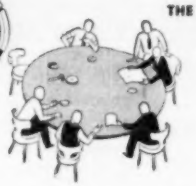
The Gisholt Fastermatics are built in three sizes ranging from 21" to 36½" swing over bed.

The cost of machining these gear blanks at the Falk Corp. took a sharp drop when the Fastermatics took over. Time was cut nearly two-thirds. Moreover, human errors were eliminated, thanks to Fastermatic's ability to hold close tolerances.

One operator tends 2 Fastermatics and a honing machine. Simple tooling makes it possible to handle 9 different sizes of gear blanks.

These modern automatic turret lathes enable you to handle a larger number of operations in one chucking—and cut costs to the bone on a wide variety of work. Ask for facts about them.

GISHOLT



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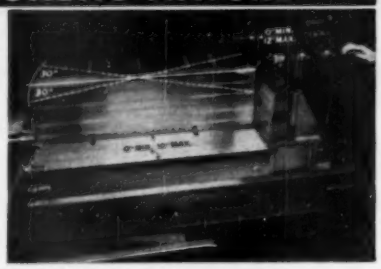

Sundstrand Magnetic Fixture showing adjustments. Note clamping is performed by merely throwing switch.

investigate the savings possible with this new magnetic holding fixture. Sundstrand Magnetic Chucks are operated with an automatic demagnetizing control. There is no tube in rectifier to burn out. Generally, the input of the control unit is 110 volt A.C., which is rectified to 6 volt D.C., which in turn energizes the chuck. The low voltage eliminates possibility of shock to the operator, and no heat is produced to affect accuracy. Controls with inputs other than 110 volt A.C. can be furnished when required.

TYPICAL SET-UPS

These three set-ups illustrate only three of many different parts that are being run over one general purpose magnetic fixture in the manufacturer's plant.

Top — Milling steel tool blocks. Parts are run in lots of one to ten and are machined all over.

Center — Milling three steel cam bars simultaneously. Bars are 3⅝" long x 2½" wide and 1¼" thick and are milled all over in six operations.

Bottom — Milling cast iron motor bracket slide. Part is held for eight different cuts with same fixture.

FREE
Additional Data

Complete information on Sundstrand Magnetic Chucks Will be sent on request. Ask for bulletin 195M.

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American Cancer Society

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THE method or process you're surest is the ultimate is the one most susceptible to improvement. Nothing is so dangerous as the method you're certain is the last word.

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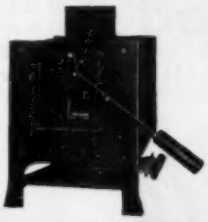

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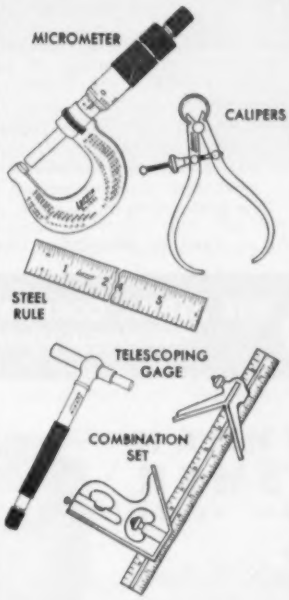

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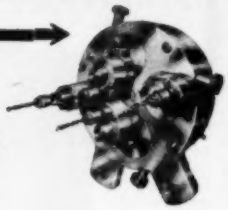

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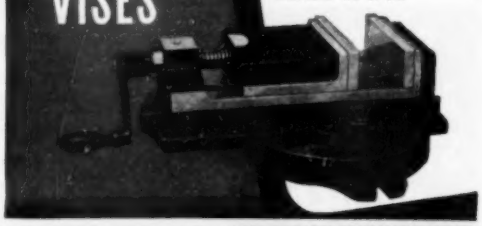

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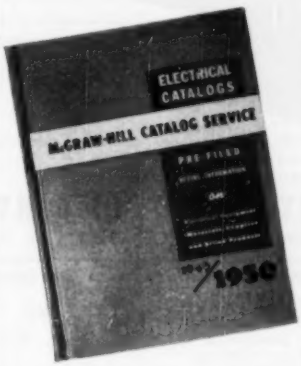

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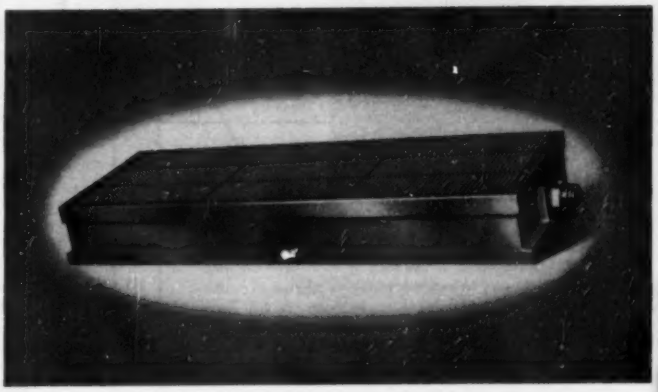

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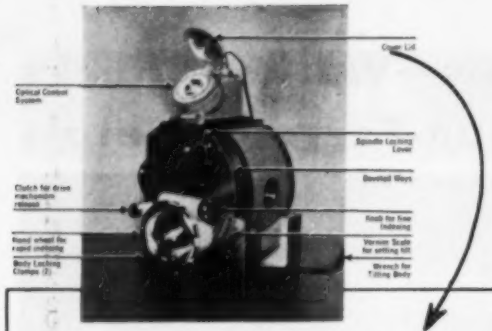

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TOOL AND die designer for power metallurgy parts. Must be able to direct tooling and press set-up. Give full details of commercial experience. Location—Midwest. Salary—open. P-6273, American Machinist.

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SALES REPRESENTATIVES needed for tool & die shop in Detroit, Michigan on commission basis. Exclusive territories open. RW-6371, American Machinist.

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SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 40 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

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1—B. & S. 2000 & 20G
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100" Niles Extra Heavy Vertical, m.d., p.r.t., late

RADIAL DRILLS

3'-9" Harris, m.d. on arm, latest
3'-9" Cincinnati-Bickford, m.d., latest
4'-9" Cincinnati-Bickford, m.d., latest
5'-11" Carlton, m.d. on arm, latest
6'-11" American Hole Wizard, m.d. on arm

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No. 615A Fellows Gear Shaper, m.d., latest
No. 72 Fellows Gear Shaper, m.d., latest
Type D Barber-Colman Gear Hobber, m.d., latest
No. 24H Gould & Eberhardt, m.d., latest
No. 3 Barber-Colman Gear Hobber, latest, m.d.
Barber-Colman Sharpener, m.d., latest

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No. 2 Cincinnati, m.d., Filmatic Spindle, latest
No. 3 Cincinnati, m.d., Filmatic Spindle, latest

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6x18" Norton Type C Hydraulic, m.d., latest
10x36" Cincinnati Hydraulic, m.d.

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12x48" Norton, m.d., latest
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No. 23A—24" Heald Rotary, m.d., latest
10x12x60" Norton Hydraulic Surface, m.d., latest
10x60" Thompson, m.d., latest
M1040 Pratt & Whitney, m.d., latest

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No. 3A Lodge & Shipley Duomatic, latest

ENGINE LATHES

10x20" Centers Monarch EE Geared Head, m.d., latest
14x30" Lodge & Shipley Selec. Head, m.d., latest
14x34" centers Lodge & Shipley, m.d., latest
14"x102" centers LeBlond, m.d. in leg, latest
15½"x30" LeBlond Regal Lathe, m.d., latest
16"x30" Reed-Prentice, m.d., latest
17½"x54" LeBlond Regal Lathe, m.d., latest
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36"x36'6" Niles Heavy Duty, m.d., latest, 2 carriages

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No. 2-26 Cincinnati Mfg., m.d., latest
No. 4-4B Cincinnati Plain Hydromatic, m.d., latest
No. 4-4B Cincinnati Duplex Hydromatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, m.d., with tracer control, latest
No. 34-36 Cincinnati Plain Hydromatic, m.d., with tracer control, latest
36-60 Cincinnati Hydromatic, m.d., latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
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No. 2 Cincinnati Plain High Speed Dial Type, m.d., latest
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No. 2, 3 Cincinnati Medium Speed Dial Vertical, m.d., latest
No. 2H, 4H Milwaukee Vertical, m.d., latest
No. 2HL Milwaukee Swiveling Head Vertical, m.d., latest
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No. 1A Warner & Swasey Universal, chucking, preselector head, latest
No. 2L Gisholt, m.d., bar and chucking, latest
No. 3S Cincinnati-Acme with cross sliding turret, latest
No. 3 Warner & Swasey Universal, m.d., bar, latest
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HEALD 281 Centerless Internal; Gagematic

GRINDERS—RADIUS—Internal

VAN NORMAN #620 Auto. Oscillating

GRINDERS—Plain & Universal

BROWN & SHARPE No. 5 Plain; cap. 3x12"
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HEALD No. 22—12" rotary
TAF PIERCE 6" Precision Rotary

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SLOTTER—Newton 24"x42" Table
THREAD MILL—Morey 4"x10' Centers (1942)
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BERTSCH ANGLE ROLLS—3"x3"x⅜"
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Bliss #20 30 Ton O.B.I.
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Largest Pitch Diameter 24", Longest Cone Distance with 12" Wheel 12⅛", PRICE $8,000.00 ea.

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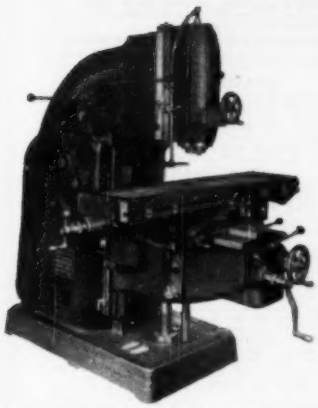

Cincinnati High Speed #3 Dial Type Vertical Milling Machine. Late Type. Range: 28"x12"x13"x6" head travel. Power Rapid Traverse. 220/440 volts. TWO AVAILABLE.

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Milwaukee #2B Dble. Overarm, Horiz.
#1M Cincinnati Horiz. Rect. Overarm.
#3 Dial Type, H.S. Cincinnati Vertical Mill.
#2, #3, #4 Cincinnati High Power Vert.
#4-36 Cincinnati 4-Spdle. Duplex Hydromatic
#4-36 Cincinnati Plain Hydromatic.
Sundstrand #0 Hydraulic Feed Rigidmill.
Cincinnati #0-8 Automatic Horizontal.
Cincinnati #0-8 Vertical.
Cincinnati #2-18 Automatic Horizontal.
Brown & Sharpe #12 (Electrics Built-in) 24"
Nichols Hand Mills (Late Type).
Van Norman #3V Ram Type Vertical Mill.
#4 & #5 Cincinnati High Power Horiz.
Cincinnati 24" Auto. Duplex.

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36"x30' LeBlond Q.C.G. Hvy. Duty Grd. Hd.
28"/56"x9' Putnam Q.C.G. Extension Bed Gap.
26"x14' Lodge & Shipley Q.C.G. Taper.
25"x14' LeBlond, Taper Att. Motorized.
24"x16' American, 11' C.C. Taper Att.
24"x8' Lodge & Shipley, Q.C.G. Motorized.
22"-46"x10' Q.C.G. Putnam Extension Bed Gap
20"x18' American Q.C.G. Grd. Hd. Taper Att.
20"x10' Hendey Q.C.G. Taper Att. Motorized.
18"x6' American Q.C.G. Grd. Hd. Taper Att.
18"x6' Monarch Q.C.G. Grd. Hd. Motorized.
16"x8' Hendey Q.C.G. Taper Att. Motorized.
14"x8' Reed-Prentice Grd. Hd. (REBUILT)
14"x6' Hendey Q.C.G. Taper Att. Motorized.
12"x6' Hendey Q.C.G. Taper Att. & Equipment
11"x3' South Bend, Q.C.G. Motorized.
10"x24" Logan Q.C.G. #825—(NEW)

Single End Punch & Shear. Morgan #170. Architectural Jaw. 11" Throat. 2½" Stroke. 6" Shaft. 220/440 volts.

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Cincinnati 6"x18" Hydraulic Cylindrical. FILMATIC BEARINGS. Built-in Controls.
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Norton 6"x30" 'C' Hydraulic Cylind.
Norton 10"x24" Hydraulic Cylindrical.
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Pratt & Whitney 22" Vertical Rotary.
Norton 6"x18" Vert. Hydraulic Surface.
Norton 6"x18" Horiz. Surface. Hydraulic.
Abrasive 22"x7"x12" Vert. Surface.
Besley #205—18" Dble. End Disc Grinder.
Cincinnati #2 Tool & Cutter Grinder.
Norton 6"x18" 'C' Hydraulic Cylinder.
Brown & Sharpe #4 Univ. Cylin. 12"x60".
Brown & Sharpe #5 Cylindrical. 3"x12".
Brown & Sharpe #13 Univ. & Tool, 8"x24".
Gallmeyer Livingston #4 Tool & Cutter.
Heald #25 Horiz Rotary
Heald #22 Horiz. Rotary
Porter-Cable #BG-8 Belt Grinder.
Norton #2 Univ. Tool & Cutter.
Thompson 18"x6" Hydr. Surface.
Pratt Whitney 14"x36" Vert. Rotary.

Leach 6"x12" Horizontal Surface Grinder. NEW. 2-Speed Ball-Bearing Spindle. Motor in cabinet base. Immediate delivery from stock. 3-60-220 Volts.

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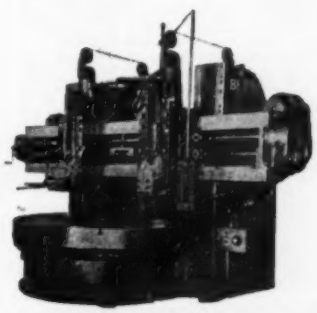
3⅛" bar Giddings & L. Horiz.
5" bar Barrett #2 Cylinder. Boring.
8" bar Barrett #6 Cylinder. Boring.
Ryerson #11 Horiz. 3" Capacity, #6 M.T
24" Bullard Vertical, 220/440 motor.
42" Bullard Vertical, 220/440 motor.
54" Bullard Vertical 220/440 motor.
42" Gisholt Vertical, 220/440 motor.
120" Niles B & Pond Vertical



Betts 100" Vertical Boring & Turning Mill. 1944 machine. 2 plain heads. Complete Electrical.

PLANT LIQUIDATION
• INSPECT UNDER POWER NOW •
LATE TYPE TOOL ROOM EQUIPMENT

MONARCH #NN 36"x108" Grd. Hd. Lathe.
MONARCH 18"x96" Grd. Hd. Lathe.
MONARCH 16"x72" Grd. Hd. Lathe.
MONARCH 16"/18½"x30" Grd. Hd. Lathe.
(10) LeBlond Regal 13"x30" Grd. Hd. Lathes.
(2) LeBlond Regal 15"x42" Grd. Hd. Lathes.
(2) Warner Swasey #1A Univ. Grd. Hd. Turret Lathes, one chucking, one Bar Feed & Chucking.
Kearney & Trecker #3K Horizontal Mill.
Kearney & Trecker #2K Vertical Mill.
Kearney & Trecker #2 Universal Horiz. Mill.
Shields-Morey 12"x60" Thread Miller.
DO-ALL 26" Band Saw.
Racine 'Oil-Cut' 6"x6" Hack Saw.
UNIVERSAL 4" Horiz. Boring Mill. 42"x60" table. 60" Vert. Travel. 96" to outboard support.
48" Giddings & Lewis Rotary Table.
UNIVERSAL 3" Horiz. Boring Mill. 26"x58" table. 27" vert. travel. 65" to outboard support.
UNIVERSAL 3" Horiz. Boring Mill. 34"x58" table. 34" vert. travel. 96" to outboard support.
3/60/220/440 volts motors.

IMMEDIATE SHIPMENT

UNIVERSAL MILLING MACHINES

B & S #2, 20"x5"x17½".
B & S #1½, 20"x7"x18".
Garvin #2MU, 24"x8"x18".
Kempsmith #2, 28"x8½"x18".
Cincinnati #2M, 28"x10"x18".
B & S #3, 34"x10"x21".
Cincinnati #3S 34"x12"x20".
Cincinnati #2, 28x7½x18.
Kempsmith #3, 34x10x19.
LeBlond #4 Hvy. Duty. 40x10x14

PUNCH PRESSES

Bliss #84 S.S.S.A. 56 tons. 10" Stroke. 20" between uprights.
Bliss #75½ S.S.S.A. 120 tons. 5½" Stroke. 24" between uprights.
O.B.I. Bliss #18, 19C, 20, 20B, 21 motorized.
O.B.I. Michigan, 36 tons cap. Wide ram & bed.
#68C Bliss Dble. Action 3-Crank.
#91C Toledo Sgle. Act. Dble. Crank S.S.
#305 Bliss S.S.S.A. 95 tons Cap.
#3A Bliss S.A.S.S. Dble. Crank. 42 Tons.

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LATEST TYPES — GUARANTEED MACHINE TOOLS 1941-1946 MODELS

MILLING MACHINES
MILWAUKEE—2H Universal, N.S.
MILWAUKEE—2K Vertical, Sliding Head, N.S.
CINCINNATI—2H Vertical, Rotary Table
CINCINNATI—60 Vertical
CINCINNATI—4-36, 4-48, 36-96, Hydro.
CINCINNATI—46-96 Hydromatic Rail Type, 2 Vert. Spdls. Tracer control
SUNDSTRAND—93—Rigidmil, 2 Vert. Heads
SUNDSTRAND—66—Rigidmil, Duplex—(arr. for milling the cam tracks in propeller hubs or similar works)
SUNDSTRAND—60—Rigidmil, Hydraulic
BRIDGEPORT—Vertical, Turret, Hand Feed
MOREY—No. 1200 2-spindle Profiler
TAYLOR & FENN—M-60 Duplex Spline
TAYLOR & FENN—Vertical
RICE BARTON—Model K Duplex Spline

THREAD MILLERS & TAPPERS
HANSON WHITNEY—8"x18" Thread Miller
MOREY—12"x60" Thread Miller
LEES-BRADNER—#40A Thread Miller
HALL-PLANETARY—Type "B" & "C" Thread
KAUFMAN—5A—Tapper, Lead Screw Type
MURCHEY—#22—Tapper, Horizontal

GRINDERS—THREAD
EXCELLO—No. 31 & No. 33 External
JONES & LAMSON—TG-636 External
JONES & LAMSON—TG-1245 External
JONES & LAMSON—TG-125 Internal

GRINDERS—CYLINDRICAL
LANDIS—4"x12" Type "H" Hydraulic, Plain
LANDIS—10"x18" Type "C" Hydraulic, Plain
LANDIS—18"x32" Type "D" Crankpin, Hydraulic
CINCINNATI: #2 Centerless
CINCINNATI—6"x18" Hydraulic, Filmatic
CINCINNATI—10"x72" Hydraulic, Filmatic
NORTON—12"x36" Model "C" Universal
BROWN & SHARPE—No. 5, 10 & 23, Plain

GRINDERS—INTERNAL
HEALD—72AS Plain, Fixed or Cross Feed Hd.
HEALD—72AS Plain & Universal
HEALD—72AS Sizematic, 72AS Centerless
HEALD—172 Gap Bed, Sizematic
BRYANT—412 Universal, Hydraulic
BRYANT—16-28 Hole Grinder
BRYANT—24-36 Heavy Duty
RIVETT—No. 104 Tool Room Grinder

GRINDERS—RADIUS
VAN NORMAN—No. 73, 626, 636, 639, 640, Oscillating
VAN NORMAN—No. 3½ Universal

GRINDERS—SURFACE
THOMPSON—6"x12"x18" Type "B" Hydr.
THOMPSON—12"x12"x40" Type "B" Hydr.
THOMPSON—12"x18"x96" Type "C" Hydr.
THOMPSON—30"x30"x120" Type "C" Hydr.
HEALD—No. 22 Rotary, 12" Mags. Chuck
ARTER—Model A-1, 8" Rotary
GARDNER—Model 120A Opposed Hd. Disc Grinder

HONING MACHINES
MICROMATIC—Model H-310 Hydrohoner, D.E.
MICROMATIC—Model H-2 Hydrohoner, S.E.

LAPPING MACHINES
NORTON—No. 26 Hyprolap
NORTON—Model 2F x 40" Hand Lapping
CINCINNATI—No. 2 Centerless
ULTRA-LAP—No. 10 Lapping

GEAR & SPLINE GRINDERS
PRATT & WHITNEY—10" Single Wheel
PRATT & WHITNEY—10" Double Wheel
PRATT & WHITNEY—18" Single Wheel
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GLEASON—No. 17 for Spiral, Zerol and Hypoid

GEAR CUTTING MACHINES
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FELLOWS—No. 6H & 6HA Gear Shapers
FELLOWS—No. 72 Gear Shaper
FELLOWS—No. 7 Gear Shaper
FELLOWS—Straight Line Generator
FELLOWS—Model Z Horiz. Shaper 8" cap.
GLEASON—3" Bevel Gear Generator
GLEASON—12" Straight Bevel Gear Generator
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FELLOWS—#4 Shaver, fine pitch
GLEASON—Nos. 4 & 6 Bevel Gear Testers
GLEASON—No. 13 Bevel Gear Tester, Univ'l.
GLEASON—3" Bevel Gear Tester
ILLINOIS—No. 224 Involute Checker with or without recorder
NATIONAL BROACH—Model SIC-12" Gear Tester

PRECISION BORING
HEALD—48A Borematic, S.E., 2-Sp. & 1-Sp.
HEALD—47A Borematic, S.E., 2-Spindle
HEALD—46B Borematic, double end Multi-spindle

LATHES—PRODUCTION
LODGE & SHIPLEY—9A Duomatic
LIPE-ROLLWAY—15"x30" Carbomatic
MICHIGAN TOOL—No. 1700 Univ'l Relieving
LEBLOND—25"x48" Engine Lathe, raised to 40"

TURRET LATHES
BULLARD—24", 30", 42" & 54" Spiral Drive, Vert.
WEBSTER & BENNETT—42" Vert. (new)
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GISHOLT—No. 5 Ram Type, Bar
JONES & LAMSON—No. 5 Ram Type, Bar
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WARNER & SWASEY—No. 3A Saddle Type, Bar
FOSTER—No. 4F Fastermatic

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CONE—Cincmatic, 1⅞", 6-spindle

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BAKER—No. 21T, Upright, Heavy Duty
BAKER—No. 36-HO 2-spindle, Inverted
FOSDICK—Model 4BM, Upright, High Speed
PROVIDENCE ENG.—3/16" Sensitive, 6-spindle
P. & W.—½ Bs50 Deep Hole Reamer

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OLIVER—10" Template Tool Bit Grinder
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KENT—3½" Bar Pointer
OSBORN—No. 194 Core Blower, for foundry
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DENISON—#18AM Hydr. Test Stand
RUSSELL Cold Saws, 6" & 12" (new)
GEN. ENG.—Riveter 24" throat
MATHEWS—70A Marking Machine
LINK—Spring Checker PB4—250"

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18"/38"x10' LeBlond Sliding Bed Gap Lathe, new in 1946, complete

20"x78" LODGE & SHIPLEY Toolroom Lathe, taper, chucks, 1943

20"x96" cc AMERICAN 12 Speed Timken Head Lathe, taper, rapid traverse, 1938

30"x144" cc NILES "Timesaver" Lathe, new in 1941, rapid traverse

48"x20' cc DRIGGS Geared Head Lathe

No. 2L GISHOLT Turret Lathe, preselector head, bar feed, complete collets, taper, threading attachments, chuck, 1942.

10"x48" NORTON Type C Hydraulic Cylindrical Grinder, 1942

20"x96" NORTON Type A Cylindrical Grinder

24" x 192" cc NORTON Type D Cylindrical Grinder, new 1943, like new condition

10 ton 54" FOOTE BURT Vertical Broach, 1941

4' HAMMOND Jackknife Radial, 1942

36"-42" BULLARD New Era Vertical Turret Lathes

84" CONSOLIDATED COLBURN Vertical Boring Mill, 2 swivel heads, rapid traverse, AC—MD

48" x 48" x 16' CINCINNATI Hypro Planer, vari-voltage drive, 1941.

O'CONNELL MACHINERY Co
1875 NIAGARA ST BUFFALO 7 N Y

UNUSUAL VALUES

Milling Machines—No. 1 Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 10"x36" Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x8', 8', 10'—20"x16'—all cone head, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 15" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24" B.G. crank.

Turret Lathes—J & L 2"x16"—3"x26" also Asmo, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3⅛" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt 25 24" RH Duty 3" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

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TYPICAL SNOW VALUES

1—18"x8' AMERICAN Engine Lathe.
1—#3 BARDONS & OLIVER Turret Lathe, complete for bar and chucking, late type.
1—#2MH CINCINNATI Plain Miller.
1—#1 BAKEWELL Tapping Machine, late type.
1—Single Spindle PRATT & WHITNEY Profiler, motor-driven.
1—4½"x36" PRATT & WHITNEY Thread Miller, 1940.

Presses, Lathes, Grinders, New and used.

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381 Broadway — Westwood, N. J.
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FOR SALE—ALLEN TYPE KH DRILLS
(1) ALLEN FOUR SPINDLE TYPE KH DRILLS. PRICE ..... $1,250.00 ea.
(1) ALLEN SIX SPINDLE TYPE KH DRILLS. PRICE ..... $1,650.00 ea.
#2 Morse Taper, ⅝" Drilling Capacity, Hand Feed to Spindle.
1942 MODELS PRACTICALLY NEW
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517 South Delaware St., Indianapolis 4, Indiana

LATEST TYPE *Nearly New* MACHINES

BORING MILLS—Horizontal
DETRICK & HARVEY 6" bar, Floor Type, M.D.
GIDDINGS & LEWIS #23T, 2¾" bar, Latest Type
HEALD 48A, 49 single end, Horomatic, Latest
LANDIS—#25—2¾" bar, floor type, M.D.
LUCAS #41, 2" bar, Table Type, Late Type
LUCAS #45, 5" bar, Table Type, Floor Type, M.D.
NILES-BEMENT-POND 5", 6" bar, Floor Type, M.D.
UNIVERSAL 3" bar, high speed, latest type

BORING MILLS—Vertical
BULLARD 8", 9 spdls, Mult-Au-Matic, Type J, Latest
BULLARD 12", 6-spindle Mult-Au-Matic Type D, Latest
BULLARD 24", 36" Turret, "New Era" Side Head, M.D.
BULLARD 24", 36", 42" Vert. Turret "Spiral Drive" High Speed, Latest Type
BULLARD 64" "Cutmaster", Latest Type
COLBURN 72", 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, Rapid Traverse, AC M.D.

BROACHES
CINCINNATI 1-30, 5-30 Duplex Vertical Surface, Hyd., Double Ram, Model ER, Latest Type
LaFOINTE 5-30 Vertical, Hyd., Latest Type

DRILLS—Miscellaneous
BARNES H-5 "Hydram" Hydraulic, 3" capacity—for inverted drilling, Latest Type
LELAND & GIFFORD #1LMR, 4 Spindle, Latest Type
LELAND & GIFFORD—2, #2MR Single Spdle
LELAND & GIFFORD #3 LMR 6 spindle, Latest
LELAND & GIFFORD 18 spindles, Hyd., Latest Type
NATCO #4AL Multiple, 36 spindles

GEAR CUTTING EQUIPMENT
BARBER COLMAN Type A Hobber, Long Base, for Splines, Latest
BARBER COLMAN #12 Hobber, Single and Double Overarm, Motor Drive
BILGRAM 6" and 10" cap., Bevel Gear Gen., M.D.
BROWN & SHARPE #13 Spur and Bevel Cutter, M.D.
CROSS #1 Tooth Rounding Machine, Motor Drive
CROSS #50 Universal Gear Chamferer, Latest Type
FELLOWS Model 7GE, 61A, 6Z2, Z, 7A, 7, 72, 72S, 77 High Speed Gear Shaper, Latest Type
FELLOWS #12M Involute Measuring Instrument, latest
FELLOWS #13L8 Lapper, latest type
FELLOWS 8M Red Liner, Latest Type
GLEASON #14 Hypoid Spiral Grinder, Latest Type
GLEASON 8", 12" straight bevel generator, latest type
GLEASON #6, #18 Bevel and Hypoid Tester
GLEASON #16 Hypoid Generator, Latest Type
GLEASON 24", 17", 90° Straight and Bevel Gear Planer, Motor drive
GOULD & EBERHARDT 12H Hobber, DIFF., Latest
GOULD & EBERHARDT 18H Hobber, Motor Drive
GOULD & EBERHARDT 96H Hobber, with diff. M.D.
GOULD & EBERHARDT 10" Grinder, hyd., latest
PRATT & WHITNEY & SCHUTTE #1 Hobber, Motor Drive
SCHUCHARDT & SCHUTTE #1 Hobber, Motor Drive

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 3, 5, 4, Universal, Latest
BROWN & SHARPE #5 Plain, 3 x 12, Latest Type
BROWN & SHARPE #2 Plain, Hyd., Latest Type
LANDIS 4x12, Type H, Plain Hyd., Latest Type
LANDIS 6"x18" Type C Plain, Hyd., Latest Type
LANDIS 20"x130" Plain Roll, Hyd., Latest Type
LANDIS 20"x130", 6"x36", 14"x36", 10"x72" Type C, Plain, Latest Type
NORTON 6"x18", 6"x36", 14"x36", 10"x72" Type C, Plain, Latest Type

GRINDERS—Miscellaneous
BARBER COLMAN #3, #4 Hob Sharpener, Latest
BROWN & SHARPE No. 13 Univ. Cutter & Tool, Lat.
BROWN & SHARPE No. 16, 16-CP-16, 24-36" Internal, #2, #6, 16-CP-16, 16-CP-16, 24-36" Internal, Hydraulic, Latest Type
BRYANT #3, #6, 16-CP-16, 16-CP-16, 24-36" Internal, Hydraulic, Latest Type
CINCINNATI "Monoset" Tool & Cutter, Latest
FITCHBURG 14"x27" Spline hydraulic, latest
GARDNER 24-52" Disc Grinder, Latest Type
GLEASON #12 tool sharpener, Latest Type
HEALD 72A3, 72A5 "Gagematic" Internal, Latest
HEALD 72A3, 72A5, 74 Internal, latest
HEALD #81 Internal, Centerless, Sizematic and Gagematic, Latest Type
KEARNEY & TRECKER Face Mill Grinder, Latest
KEARNEY & TRECKER 6x15, 8x48 Auto Thread, latest
JONES & LAMSON 6x15, 8x48 Thread, latest type
LANDIS #6, 6x24 Thread, Latest Type
LANDIS #12 Centerless, Hydraulic, Latest Type
La POINTE 60" Universal Broach Sharpener, Latest
THOMPSON 6"x18" Auto. round broach M.D.
VAN NORMAN #639, #73 Oscillating Radius Grinder, Latest Type
VAN NORMAN #666 Crankshaft Re-Grinder, Latest

GRINDERS—Surface
BLANCHARD #11, 16" dia. mag. chuck, Latest
BLANCHARD #16, 24" dia. mag. chuck, Motor Drive
BLANCHARD 16A Vertical Dial Feed, Motor Drive
HANCHETT Series 300 12"x48" Vert. Hyd., Latest
HANCHETT #56 Vert. 36" dia. mag. chuck, Latest
HANCHETT #120 30x120" Plano, Hyd., Horiz. Latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD 25A—rotary—16", 24", 30" chuck, Hyd., Latest
NORTON 6x18 Hydraulic, latest type

JIG BORERS
KEARNEY & TRECKER Model B Autometric, Latest
PRATT & WHITNEY 1A, Motor Drive
SOCIETE GENEVOISE (SIFF) #4 Precision, Table 19"x27", Motor Drive

LATHES—Engine and Mfg.
AMERICAN 16"x34", Centers, Geared, Motor Drive
AMERICAN 42"x200" Centers, 2 carriages, motor drive
AMERICAN 36"x360 centers, Latest Type
HENDEY 12x30", 14x30", Timken, Latest Type
JONES & LAMSON "Fay" 20x22", 24x24 autom., latest
LeBLOND 21"x30" Centers, Geared Motor Drive
LEHMANN 16x30" Centers, 16"x30" Timken, Latest
LODGE & SHIPLEY 16x72 centers, M.D.
LODGE & SHIPLEY 4x84, 8x60, 8x108, 9x240, Latest
LoSWING 4x60, 4x84, 8x60, 8x108, 9x240, Latest
MONARCH 10"x20" centers, Model CKK, Timken, late
MONARCH 12"x30" Centers, Model CK, Timken, late
MONARCH 12"x54" Centers, Model EK, Timken, latest
MONARCH 24"x54" Ball Bearing, Geared Head, M.D.
MONARCH 24"x192" Centers, Model CM, Timken
MONARCH 22"x156" Centers 3 Carriages, Timken Bearing, Model CM, Motor Drive
NILES 20"x50" Boring "Time Saver" Timken, Latest
PRATT & WHITNEY 16"x30" centers, Timken, Latest
PRATT & WHITNEY 16"x120" centers, Bench, latest
PRATT & WHITNEY Centers, Motor Drive
PUTNAM 41"x25" Centers, Model A, Latest
REED PRENTICE 20"x54" Centers, Toolroom, Latest
SOUTH BEND 14½"x96" Centers, Timken, latest type
SPRINGFIELD 16"x30" centers, Timken, latest type
WARD, HAGGAS & SMITH—18/30x60" centers gap motor drive, Latest Type

LATHES—Hob and Cutter Relieving
CLEVELAND 12"x16" Centers, Cutter, Motor Drive
MICHIGAN 17½ Universal, Latest Type
U.S. Tool #810B, 8"x15" Centers, Cutter, Latest

LATHES—Turret
BARDONS & OLIVER #5, #7, TIMKEN, Latest Type
CINCINNATI ACME No. 1 Timken, Latest
FOSTER #4FU "Fasternatic," Timken, Latest
GISHOLT #1L, #2L, #3L Universal, Timken, Latest Type
GISHOLT #3, #4 Univ., Timken, Latest
JONES & LAMSON #2 Univ., Timken, Latest
LIBBY "International" 1H5 Univ., Timken Bearing, latest
MOREY No. 20, No. 3, No. 4 Timken Bearing, latest
POTTER & JOHNSTON 5-15DE, Timken, Latest
WARNER & SWASEY 2, 5, Universal, Latest Type
WARNER & SWASEY #2, #3, Timken, Latest
WARNER & SWASEY 2A Universal, Timken Bearing
WARNER & SWASEY 2A and Chucking, Latest Type
WARNER & SWASEY 3A Universal, Timken Bearing "Pre-selector" Bar and Chucking, Latest Type
WARNER & SWASEY 3A Universal, Timken Bearing Bar and Chucking, Latest Type

MILLING MACHINES—Mfg.
BROWN & SHARPE #2, Plain Miller, 3 heads, Latest Type
GRAY 84"x32"x16" Planer Miller, latest type
HALL Style L, Planer Miller, 4 heads, AC, M.D.
INGERSOLL 42"x38"x12" adj. rail, 4 heads, AC, M.D.
INGERSOLL 32x24x16" Planer Type, 2 heads, AC, M.D.
INGERSOLL 30x24x12" adj. rail slab, M.D.
INGERSOLL 30x24x12" adj. rail slab, M.D.
SUNDSTRAND #8 Duplex 42° feed, Latest
SUNDSTRAND #8 Duplex Spline, latest
TAYLOR & PENN M50 Duplex Spline, latest
TAYLOR & PENN M50 Duplex Spline, latest

MILLING MACHINES—Plain
BROWN & SHARPE #2, Light Type, Timken, Latest
BROWN & SHARPE #2, 24" feed, Latest Type
BROWN & SHARPE #000, Timken, Latest Type
BROWN & SHARPE 2B, 2B, Timken, Latest Type
BROWN & SHARPE 2B Automatic, Latest Type
CINCINNATI 0-8, 1-12, 1-18 Automatic, Late Type
CINCINNATI #2, #4, #5 High Power, Latest Type
CINCINNATI #36 Hydromatic, Simplex, Latest Type
KEARNEY & TRECKER #2H, 3H, 4H, 5H, Latest
KEARNEY & TRECKER 121B, 1404, Simplex, Latest
KEARNEY & TRECKER #4 Timken, Latest Type
KEMPSMITH #50, #4 Timken, Latest Type
KEARNEY & TRECKER 4K, Timken Bearing, Late
KEARNEY & TRECKER 4K, Timken Bearing, Late

MILLING MACHINES—Thread
LEES BRADNER Model LT, 6"x36" Centers, Latest
LEES BRADNER Model HT, 12"x54" Centers, Latest
MOREY 12x30", 60", 120", 190 centers, Latest Type
PRATT & WHITNEY 4½"x12" Model C, Latest Type
PRATT & WHITNEY 6"x60" Model C, Latest Type

MILLING MACHINES—Universal
BROWN & SHARPE No. 2A Timken
BROWN & SHARPE No. 2A, 4A, Motor Drive
CINCINNATI #2MH, Timken, Latest Type
KEARNEY & TRECKER 2H, Timken, Latest Type
KEMPSMITH #4 Maxi-miller, Timken, latest type
VAN NORMAN #23 duplex, Motor Drive
VAN NORMAN #236, Timken, Latest Type

MILLING MACHINES—Vertical
BROWN & SHARPE #2 Standard Timken, Latest
BROWN & SHARPE #2, Dial Type, High Speed, Latest
CINCINNATI #9B TIMKEN, Latest Type
CINCINNATI #9B Super-Speed, Latest Type
GORTON 8D, 8½D Super-Speed, Latest Type
KEARNEY & TRECKER 2H, 2K, 3H Timken, Latest
KEARNEY & TRECKER Simplex Profiler, Latest
MOREY 12M Single & Double Spindle Profiler, Latest
REED PRENTICE 3VG, with or without hydraulic duplicator, Timken bearing, Latest Type

PLANERS
BETTS (CONSOLIDATED) 84"x92"x16' 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
BETTS (CONSOLIDATED) 108"x84"x50' 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type, Motor Drive
CINCINNATI 96"x30"x8", 4 heads, PRT, DC, M.D.
CLEVELAND 42"x18"x12" Openside, PRT, DC, M.D.
CLEVELAND & HARVEY 48"x16"x16' 4 heads, Hydraulic Rapid Traverse, A.C. Motor Drive
DETRICK & HARVEY 48"x16"x16' 4 heads, Box Table, Rapid Traverse, A.C. Motor Drive
NILES 108"x84"x42" 4 heads, Box Table, Rapid Traverse, D.C., M.D., Late Type
NILES 42"x42"x16' "Time Saver" Box Table, 3 Heads, PRT, VARI-VOLTAGE Drive, Latest
NILES 96"x96"x24' 4 heads, Rapid Traverse, Box Table, D.C. reversing motor drive

PRESSES
BIRDSBORO 325 ton, vert, hyd., Latest Type
BIRDSBORO 75-25 Hydro-Dynamic, Double Action, Latest
BLISS 75-25 Quenching, Hyd. Motor Drive
GLEASON 15" Quenching, Hyd. Motor Drive, Roll Feeds, M.D.
HENRY & WRIGHT 50 ton Vert. Hyd., Latest Type
LAKE ERIE 500 ton Vert. Hyd., Latest Type
NILES 400 ton, Horiz. wheel, Motor Drive

SCREW MACHINES—Automatic
BROWN & SHARPE 2G 1" capacity, M.D.
CLEVELAND 9/16", 1-1/16" Model A, Latest Type
CONOMATIC 2¾"—6 spindle, high speed, Latest Type
GOSS & DeLEEUW 6" 6 spindle Chucker, Tool
GOSS & DeLEEUW 8" 5 spindle Chucker, Work Rotating, Latest Type

SHAPERS & SLOTTERS
AMERICAN 20" Heavy Duty, Motor Drive
DILL 20"-24" Vertical, Motor Drive
ROCKFORD 30" Hydraulic Shaper-Planer, Latest

SHEARS—Power
QUICKWORK #5, 5" Cap., Rotary Shear, M.D.
QUICKWORK #6, 7" Cap., Rotary Shear, M.D.
WYSONG & MILES #372, 14 gauge x 6' Latest Type

MISCELLANEOUS
AJAX 2¼" Forging and Upsetting, M.D.
BAKER #5 Keyseater Motor Drive
BARNES #172, 206H, 307, 307B Vertical Hone, Hyd.
Self-Oiling, Latest Type
CAMPBELL #491 Abrasive Saw, Latest Type
DE LAVAL #194 Coolant Clarifier, Latest
FOSTER 6"x18", 4"x36" Superfinisher, Latest
HELLER Model 8S-1 Cold Saw, 6" cap., M.D.
LANDIS 2 Single Spdle Bolt Threader, M.D.
MANVILLE 2D 7/16" Cap. SSRD, Ball Header, M.D.
NAZEL #4B Pneumatic Hammer, M.D.
PRATT & WHITNEY (KELLER) Type HL-2416, Type G, Copying 2 and 3 dimensional, Latest Type
ROWBOTTOM Cam Miller, Motor Drive

YOUR MACHINERY BUDGET IS OUR BUSINESS

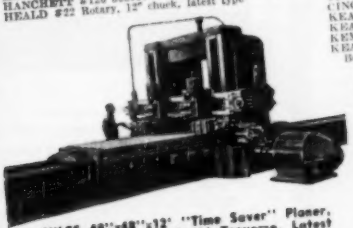
You know how much you can afford to spend for machine tools in the coming year. It is our business to help you spend that money to the best possible advantage.

That is why we say this—call in a MOREY representative, without obligation on your part, to sit in on your purchasing discussions.

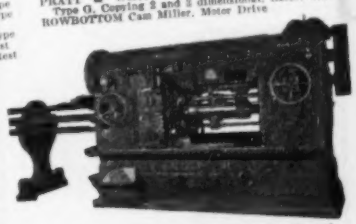
His suggestions as to how you can stretch your budget with NEARLY NEW machines may mean all the difference between profit and loss in your business.

WATCH THIS PAGE!

For MODERN high quality machine tools nearly all built new since 1941. These tools are priced well within your equipment budget. *Wire, write or phone for pictures, details and prices, today.*



NILES 48"x48"x12' "Time Saver" Planer, Box Table, Power Rapid Traverse, Latest Type



CONOMATIC 2¼" 6 spindle High Speed Automatic Screw Machine—Latest Type

Most Built After 1941

Available for Prompt Shipment

America's Largest Stock — Send for Latest Catalogue

MOREY MACHINERY CO., INC.

FOR MORE VALUE...

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TELEPHONE, CANAL 6-5360
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CONSIDER MILES TOOLS FIRST

BORING MACHINES

Nos. 47A, 48A Heald Borematic
No. 49 Heald double end
Nos. 112B, 1212 & 2112 Excello
Vernon Jig Borer
No. 2 Pratt & Whitney jig borer
3" No. 31 Lucas horizontal
3½" No. 32 Giddings & Lewis
3½" No. 32 Lucas horizontal
4½" No. 33 Lucas horizontal
5" Jones planer table type
52" King vertical
100" Niles Bement Pond, vert.
24" Bullard vertical turret lathe
30" Bullard single turret head vert.
36" Bullard spiral drive vertical turret lathe
Natco 1-way horizontal
No. 4 HH Baker 2-way with mult. heads.
Manson double end

DRILLS, UPRIGHT & HEAVY DUTY

20" Barnes box column
20" Clet. Blck. Super Service
20" Colburn No. 2
20" No. B22SH Natco
21" Barnes No. 210, 4 spdl.
21 Cassady Otto, NEW
21" & 24" Cincinnati Bickford
22" No. 121 Baker box column
24" No. 217 Baker 3 spdl.
24 Hokame, SH, BG, PF, TA
24" No. 25 Foote Burt heavy
24" No. 315 & 310 Baker
29" Aurora sliding head bg.
No. 30 HO Baker 2 spdl. inverted

DRILLS, MULTIPLE & MISC.

12 spdl. No. 39 Natco rail
12 spdl. No. 25 Baush rail
16 spdl. No. 2BL Natco multiple
22 spdl. No. 14 Natco multiple
24 spdl. No. B4A Natco multiple
34 spdl. No. 30 Natco multiple
42 spdl. No. B16 Natco multiple
Manson two way
Type 4HH Baker two way hydr.
Natco one way
Barnes 2 spdl. deep hole
No. 15½ Foote Burt hydraulic
5 spindle Detroit horizontal
15" column Strokes
24" 4-spdl. Allen sensitive
24" 6-spdl. Foote Burt sensitive
24" 4-spdl. Domco sensitive
24", No. 4B Edlund, power feed

GEAR MACHINERY

No. 5M Adams Mfg. hobber
Types A & T Barber Colman
Nos. 3 & 12 Barber Colman
No. 72 Fellows gear shaper
No. 8M Fellows gear checker
No. 6 Fellows gear shaper
No. 130 Cleveland Rigid hobber
No. 18M G & E hobber
Nos. 8H, 12H & 16HS G & E
Nos. 1, & 5A Loos Bradner
24" x 12" Flather automatic spur
Cincinnati Peerless chamferer
2 spdl. Lips chamferer
3" Gleason spiral bevel gen.
No. 7 Gleason cutter grinder
18" Gleason lappers & testers
8" Red Ring gear lapper
12" Red Ring gear shaver
"MAL" Barnes gear lapper

PRESSES

No. 6 Amer. Can OBI
No. 3 Consolidated OBI
No. 19 Waterlown OBI
Nos. P1, P2, P3, P4 & P5 Ferracute
No. PG5 Ferracute
No. 52P Toledo punching
No. CA4 Ferracute adj. bed
No. 11 Toledo adj. bed horning
Nos. 73½, 75½ & 304 Bliss
No. 52 Toledo Arch. Frame
No. 500 Bliss straight side, Roll Feed
No. 56 Toledo straight side
No. 267 Hamilton, air clutch
48" No. 205C Toledo double crank straight side
600 ton No. 2136½ Hamilton straight side eccentric shaft
150 ton EG 52 Ferracute coining
1000 ton No. 600 Toledo coining
No. 52 Toledo arch frame
48" No. 93½ Toledo double crank
No. 202B Toledo double crank
150 ton No. F1330-36 Clearing
No. 1½ & 1½-C Bliss cam draw
1000 ton Baldwin Southwark hydraulic
20" stroke, 42" x 54" bed, 56" daylight, new 1940
150 & 100 ton HPM hydraulic
75 ton Southwark hydraulic
35 ton Metalwood straightening

MILES MACHINERY CO.
SAGINAW, MICHIGAN

LATE TYPE MACHINE TOOLS

AUTOMATICS

6" RPA-8 Acme-Gridley Chucker. 1941.
16" Bullard Mult-Au-Matic, 6 spdl. 1941.
3½" Cleveland Model A. 1943.
2½" Cleveland Model A. 1943
2⅝" RA-6 Acme-Gridley. 1943.
1⅝" Greenlee, 6 spindle. 1942.
9/16" RA-6 Acme-Gridley. 1942.

BOLT MACHINES

No. 500C Manville Thread Roller. Latest
No. 250C Manville Header, SSSD. Latest

BORING MACHINES

No. 42 Lucas Horizontal. 1940.
No. 2112A Jr. Excello. 1942.
No. 54 Excello Double End. 1940.
No. 46B Heald Single End. 1940.

GEAR EQUIPMENT

3" Gleason Generator. 1941.
No. 6 & 17 Gleason Testers. 1943.
12" Red Ring Internal Shaver. Late.
No. GCL Red Ring Shaver. 1942.
No. 624A3 Fellows Side Trimmer. New.
No. 645A3, 615A & 61A Fellows. 1944.
No. 7125A & 712 Fellows Shaper. 1943.
Vinco Spline & Gear Grinder, 1942.

GRINDERS, CYLINDRICAL

25"x48" Landis, Crankshaft. Like New.
16"x36" Cincinnati Plain. 1942.
12"x48" Cincinnati Univ. 1943.
10"x72" Landis Plain. 1942.
10"x18" Norton Plain. 1942.

GRINDERS, INTERNAL

No. 74 Heald Ext. Bridge. 1941.
No. 72A3 & A5 Heald Plain. 1944.
No. 5 & 16A22 Bryant. Latest.

GRINDERS, SURFACE

12"x16"x60" Thompson Hyd. Latest.
No. 22 & 25A Heald Rotary. 1943.

LATHES, ENGINE

45"x192" Axelson. 1942.
24"x168" Sidney. 1942.
18"x54" Lodge & Shipley. 1943.
16"x48" Bradford. 1942.

LATHES, PRODUCTION

Gisholt "Simplimatic". 1940.
No. 3A L&S "Duomatic". 1943.
No. 2FU Foster "Fastermatic". 1943.
8"x108" Lo-Swing Semi. Auto. 1942.
Model 8 Sundstrand. 1942.
14"x42" Monarch "Magna-Matic". 1941.

LATHES, TURRET

42"x36" Bullard Vertical. 1943.
No. 1A, 2A & 3A Warner & Swasey. 1943.
No. 1 & 8½"x24" Acme Univ. 1943.
No. 2, 3 & 4 Warner & Swasey. 1943.
No. 2, 3, 5 & 7 Bardons & Oliver. 1942.

MILLS, PLAIN

No. 5 Cincinnati. 1943.
No. 4H & 4K Milwaukee. 1943.
No. 3 Van Norman. 1942.
No. 2HL Milwaukee. 1942.

MILLS, PRODUCTION

No. 1-14 & 2-20 Kent Owens. 1942.
M-18 Kearney & Trecker. 1943.
No. 1224 Kearney & Trecker. 1942.
No. 3-36 Cincinnati Duplex, R & F. 1942.
No. 1-18, 2-18 & 2-24 Cincinnati. 1942.

MILLS, THREAD

6"x60" Pratt & Whitney. Latest.
12"x54" Lees Bradner. 1943.
6"x36" Lees Bradner. 1942.

MILLS, UNIVERSAL

No. 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 2SU & 26SU Van Norman. 1942.

MILLS, VERTICAL

No. 3B P&W Univ. Die Sinker. 1943.
No. 2K & 3H Milwaukee. 1942.
No. 2 & 3 Cincinnati. 1942.
No. 1 Cleveland. 1942.

PRESSES

No. 40-5½ Minster. 1942.
100 Ton Hannifin, Hyd. Str. 1942.
50 Ton Denison, Hyd. Str. 1942.

SHAPERS

24" Gould & Eberhardt Univ. 1942.

INDIANAPOLIS MACHINERY & SUPPLY CO.
1961 S. Meridian St.
INDIANAPOLIS 6, IND.

ONE SOURCE — ONE CALL

for any Machine Tool

WORCESTER 6-5175

BORING MILLS

Universal 4" bar, "Tri-Way", face plate to outer support 72", #6 taper, added vertical range (late)
Defiance 25A, 3⅝" bar, face plate to outer support 72", #6 taper, added vertical and cross range (late)
Lucas #33 4½" bar, face plate to outer support 84", #6 taper Morse, AC, M.D.
Fisher 5"-40"-60" heavy duty floor type horiz. DC and AC motor drive #7 taper, variable speed 1 to 200 rpm (late).
Bullard vertical 24" and 36" Spiral Drive 24", 30" and 42" "New Era" type, 3-jaw and 4-jaw chuck tables.

RADIAL DRILLS

Foodick 5'17" and 5'15" motor-on-arm "Economax" hydr. #6 taper (very late)
American 4'12" triple purpose M.D. #4 taper and 4'11" American 24 speed 7½ HP motor-on-arm, triple purpose, #4 taper.

UNIVERSAL MILLERS

Van Norman #2SU horiz. knee type, wkg. tbl. 50"x12", range 24½"x10"x17", very late.
Cinc. 1M motor-in-base wkg. tbl. 40"x10½", range 22"x8"x16", attchmts.
Brown & Sharpe #1A dbl. over, motor-in-base wkg. table 41¾"x11¼", range 22"x8"x18".

PLAIN MILLERS

Kearney & Trecker #3000 planer type, dist. between housings 44⅝", max dist. under rail 65", rapid traverse in all directions, wkg. table 30"x 134" equal to new AC motor drive, sgl. head on rail.
Cinc. #3 dial type Hi-speed wkg. tbl. 62½"x15", range 34"x12"x29" rapid traverse (late)

LATHES

Monarch 20"x72" centers, model "M", 16 spd. gr. hd. 22½" swing, Monarch auto. sizing controls (late).
American 30"x15', 12 spd. gr. hd. med. pattern Hi-duty 34½" swing, 8' centers, taper attachment
Lodge & Shipley 30"x16', 12 spd. sel. gr. hd. 34½" swing
Bridgeport 36"x36', 16 spd. gr. hd. 38" swing 48" C.D., mtrzd carriage.
Pratt & Whitney 12"x30", 16"x36", 16"x60", Model "B", motor-in-base.

MISCELLANEOUS

(New) Rafter All-Steel Squaring Shears, available in two sizes, ¼"x10' mild steel, ¼"x10' stainless steel; 3/16"x12' mild steel, 3/32"x12' stainless steel, stock delivery.

This Is Only a Partial Listing.
Send for Our Catalog.

Botwinik Brothers
of Mass. Inc.
3 SHERMAN ST. WORCESTER 1 MASS.

14"x54" Monarch 16-speed GH Lathe
16"x54" Monarch 16-speed GH Lathe
#61-A Fellows Gear Shaper
10"x48" Norton "C" Cylindrical Grinder
6'-17" Carlton Radial Drill
#3MS Cincinnati Dial Type Plain Miller
BL-3620 Keller Duplicator

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St. Providence, R. I.

AARON FOR ONE OF THE LARGEST STOCKS OF MODERN MACHINERY AT LOWEST PRICES—MONEY BACK GUARANTEES

AUTOMATICS
Brown & Sharpe #2G 1¼" cap. (2)
Brown & Sharpe, Nos. 00G, 4 and 6.
Conomatic 8 sp. 1⅞" cap.
CECO ⅝", Swiss Type
Fay Automatic, 12"x81".
New Britain No. 61—2¼" 6 spd.

BORING MILLS
Giddings & Lewis No. 0, No. 25T.
Lucas No. 31, horiz.
Heald #49 double spindle, #48A Universal 3" horiz. equipped.
Bullard 24", 36", 42" VTL
King 72" vertical

DRILLS AND RADIALS
Allen, 6 spindle, 7" overhang.
Carlton 8'-19" column
Canedy-Otto 3'-9" col.
Sibley 24"-28", Power Feeds
Hamilton, Langelier, Hi-Speed.

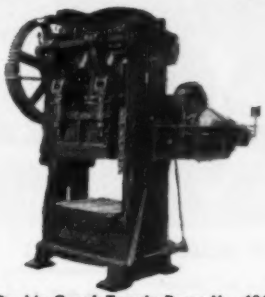
ENGRAVERS
Gorton No. 3U, 2 dimen.
Deckel GK1, 3 dimen.
Gorton Cutter Grinders 375-2, 265-6.

GEAR EQUIPMENT
Barber Colman No. 3 Precision
Fellows #7, 72, 712, 725, 7125, Hi. Sp.
Fellows 645Y
Gleason #2 Surface Hardener.
Gleason 3" Spur Bevel Generator
Hamilton Hobber #90
Michigan, Gleason, Fellows Checkers.
Mikron Gear Hobber.

GRINDERS, MISCELLANEOUS
Brown & Sharpe No. 5 cyl. 3" x 18".
B. & S. Nos. 1, 2, 3 Univ.
B. & S. No. 13 Univ. & Tool.
Cinc. No. 2 Centerless Filmatic.
Cinn. 12 x 36", 12 x 48" Filmatic Univ.
Cinn. #2 Univ. Tool & Cutter
Covel No. 91A Univ. T. & C.
Dalzen Thread, latest
Gardner #226, 30" Disc.
Hanchett #228 Disc. Dbl. opposed.
Heald 72A3 Sizematic Int. Centerless.
Jones & Lamson Thread, Univ. TG636
K.O. Lee Tool & Cutter.
Landis Centerless.
Landis No. 4H Cyl. 4 x 12", No. 6 Thread, 10 x 36" angu.
Norton No. 2 Tool & Cutter, Hyd.
Oliver 510 Drill Grinder, Sellers 4G Drill Grinder

GRINDERS, SURFACE
Abrasive #3B, 8"x24" cap.
Abrasive No. 33, 34 Vert., 8x24.
Blanchard No. 11, 16" Mag. Chuck.
Blanchard #16A—30" Chuck
Brown & Sharpe No. 5, 8x24" Hydr.
G & L Hyd. #25, 6x18", #35, 8x24".
Hanchett Model 300, 13 x 48".
Norton 6x18", and 10x36" Hyd.
Reid No. 2A P.F. MIB.
Reid No. 2C Motor Spdl. Hand Feed.
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18".

LATHES
Bradford 14"x6', G.H. Latest Sebastion 12"x4'
Hardinge Precision, 1" Collet Cap., Rivett. Precision.



Bliss Double Crank Toggle Press No. 406—48"

Bliss #1½B Toggle Press Geared, #3½A Toggle Bliss No. 304A, 306 Straight Side Presses. Bliss #8—Bed 42x96"—250 Ton. Bliss 645B, 650, 675 High Production Presses. Henry & Wright 25 and 75 Ton Dieing Presses.

HYDRAULIC PRESSES

DOWN MOVING RAM, SELF CONTAINED

MANUFACTURER	TON CAP.	STR. OPENING		PLATEN
Lake Erie	500	36"	68½	35 x 36
Baldwin Southwark	600	32"	36"	76 x 59
H.P.M. Double Action	500	24"	30"	36 x 36
Watson Stillman Shaft Straightener	500	24"	57"	24" bed.
Denison	25/50	18"	23"	22 x 20
Hannifin	50"	20"	30"	22 x 30
Southwark, D. A. Clamping Plate	150	30"	2' to 4'	84 x 30
Oilgear Shaft Straightener	35	8"	12"	84 x 11

DOWN MOVING RAM, WITHOUT POWER UNIT

Mesta	750	42"	80"	44 x 44
Chambersburg	300	10"	27"	22 x 36
Southwark	350	42"	78"	28 x 48
Southwark	550	23"	68½"	42 x 32

UP MOVING RAM PRESSES

Waterbury Farrel	1000	7"	55½"	30 x 28
Waterbury Farrel	800	6½"	28"	22 x 24
Waterbury Farrel (2 Rod)	500	6"	28¾"	28" Bet. Rods
Watson Stillman	300	12"	21"	24 x 20
Watson Stillman	300	12"	19"	20 x 20
Watson Stillman (Hob) New and Used	300	6"	22"	16 x 16
HPM	180	15"	14½"	30 x 30
Dunning & Boschert Molding Press	300	12"	38"	24 x 32 Mold
Stokes Molding Press and Pump	100	7"	24"	22 x 15
Stokes Molding Press and Pump	150	8"	31"	24 x 23
Elmes—With Elec. Plates	50	6"	12"	18 x 18
Stewart Bolling	85	10"	19"	20 x 20

WHEEL PRESSES
NILES — 600 ton 96"; 500 ton — 48"; 300 ton — 48".

INJECTION MOLDERS

ACCUMULATORS

Mfr.	Size	Pounds
HPM	6" x 9'	2000
General Electric	15" x 11'	400
Watson Stillman (13 gal) Hydr. Accu.	42 x 9 x 48"	3000

Hendey G.H. 16x30", Rel. Att.
LeBlond Regal 10"x31½', 13"x24", 15"x30", 16"x48" TA, 19"x48" TA, 21"x60"
LeBlond Heavy duty 16"x30".
Lodge & Shipley 16 x 78" T.A..

MILLS, PRODUCTION
Brown & Sharpe, No. 000, 12, 21.
Cincinnati No. 1-12, 1-18, 2-18 Mfg.
U. S. Multimiller, 1 and 2 Spindles.
Sundstrand 00 Rigidmills, Kent Owens IV.

MILLS, PLAIN AND UNIVERSAL
B. & S. No. 2B Pl., No. 2A Univ.
Cincinnati No. 3 Plain.
Cincinnati No. 2MH Univ., H.S.
Milwaukee 2HL, 2H Univ., H.S.
Milwaukee No. 2H Plain.
Van Norman Duplex, 12, 20, 22L, 36.

MILLS, VERTICAL
Index, Jackson
Brown & Sharpe No. 2 Standard.
Cincinnati No. 4, Hi-Power.
Gorton No. 8D, 9J Plain, 8½D Duplicator.
Morey No. 12M Profiler 2 sp.
Sipp MP5 Jig Borer.

PRESSES
Bliss No. 304A, 4" Str. 23"x24" bed.
Bliss No. 645B, 650, 675 Hi-Production, 58, 62, 62A, 162.
Bliss No. 8 42"x96", 250 Ton
Bliss No. 4½ Double Action Cam
Henry & Wright Dieing, 25 Ton, 75 Ton.
L. & J #2, 4, O.B.I.
Reliance 45 Ton, O.B.I.
Gen. Screw Press.
Z. & H. 30 Ton, O.B.I.
Stokes Tablet Presses, Model R & T.

TURRET LATHES
Acme No. 4W, 6W Bar and Chuck, Acme Fox.
Bardons & Oliver No. 3, 1½" cap., No. 5, Chuck.
Brown & Sharpe No. 1, 2F
Foster No. 3B.
Gisholt No. 4, 5 Bar and Chuck, 2L, Saddle Type
J. & L. No. 8A, Well Tooled, Excellent, Saddle type.
Warner & Swasey No. 3, 4, 5, Preselector, No. 4A 8" Cap.

MISCELLANEOUS
Band Saw: Tannewitz No. 36M.
Bending Roll: Buffalo No. 0, Excelsior 14, Buffalo Wrapping Roll No. ½.
Broach: American Horiz. Hyd. H-15-60.
Hacksaw: Marvel Nos. 6 and 6A Automatic Feed.
Marking Machine: Noble & Westbrook
Notching Press: Ferracute C82.
Pin Machine: Nilson.
Shaper: Sheldon 12" Brand New 24" Rockford Hyd. Heavy Duty.
Honer: Micromatic Hydrohoner, Sunnen.
Keyseaters: Mitts & Merrill, Baker, Burr, Davis.
Rivet Hammers: Hi Speed, Chic. Pneumatic.
Toolmakers Microscope: Gaertner, Bausch & Lomb, Leitz
Router: #55 Oliver.
Tapper: Bakewell #1, Haskins 3C.
Welders: Spot & Seam: Thompson, Taylor, Winfield.

Collets, etc., and 29" x 84" equipped.
Monarch 10"x20" EE, 16x78 G.H.
Monarch 12x30" Dble. Compound, swings 18"
South Bend Q.C.G., 13"x6', 10"x4', 14½"x6'.

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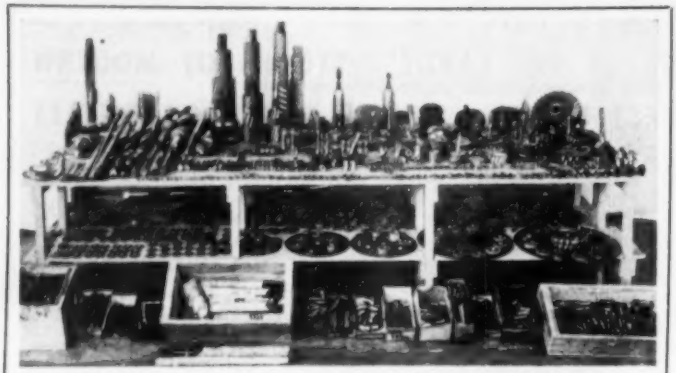
MONA member



SAMPLE OF SOME OF OUR STOCK OF METAL CUTTING TOOLS

Special Sale on $125,000.00 stock of Surplus New and Slightly Used Metal Cutting Tools. Large Drills up to 3⅞" dia. taps, reamers, countersinks, and mills, milling cutters small and large, Keyseat cutters 80 types, slab mill cutters, large and small, threading hobs, slitting saws, spot facers, broaches, shell end mills.

66⅔ OFF LIST

LATE TYPE MACHINE TOOLS IN STOCK

BRYANT 24Lx36", 24x36" internal grinder 1942—$3000.00 each.
CINCINNATI 2-24 automatic milling machine 1942—$1950.00.
FELLOWS model 712 high speed int. & ext. spline cutting index gear shaper 1942—$1750.00.
BAKEWELL #1 and #2 lead screw precision tapping machines 1941—$375.00 and $900.00.
New Late 3 H.P. air compressors and 1 and 2 H.P. monoblock centrifugal pumps at 30% off list.
100 other older but good machine tools in stock at bargain prices.

GENERAL MACHINERY & EQUIPMENT CO.
140-44 S. 17th ST.
HARRISBURG, PA.

EVERY ITEM GUARANTEED

All Late Type

#96-F Toledo Press, 300 Ton, 120x52 Bed, 14" stroke. W/3 air cushions, mtrs. controls. A-1 cond.

Bullard Multaumatics, 16", 12", 8", late
#3 Cinn. Centerless Grinder New 1945, used 7 months!
#28/60 Vertical Cincinnati Hydrotel, '44
5" Fisher Horiz. Floor Type Boring Mill, Late
5" Bar Table type boring mill, Giddings & Lewis #350T
#12 Brown & Sharpe Production Mills, 48½" x12" table size, $2250.00 ea.
9/16", 1", 1¼", 1⅝", 2¼", 2⅝" RA6 Acme Gridley Auto.
20 to 50 Ton Ferracute Presses, Stiles type only $275 and up!

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6" 6 spdl. & 8" spdl. Acme Gridley Chuckers. All Latest Type (3)

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AMERICAN MACHINIST

is an index of reliable sources for Used and Surplus Equipment Supplies now available. Consult the *Searchlight Section* in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, use the Searchlight Section of American Machinist to help you locate buyers. . . . Send a list of your equipment and we will gladly give information as to space and rates.

Classified Advertising Division

AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

No. 25T G. & L., 2½" table Hor. Mill, 1942
4" Univ. Table Mill, 60" vert. 96" hor., '43
36" & 42" King Side Hd. Vert. Mills, '43
Nos. 1A & 3 W. & S. Turrets, bar & chuck
Nos. 3 2MH Cinci. Pl. Dial Millers, late
Nos. 3K & 3H K. & T. Pl. Dial Millers, late
No. 36 Van Norman Pl. Miller, ram, '43
No. 2G Kempsmith Univ. Miller, 1943 (3)
No. 2418 Keller Duplicators ,late
No. 9J Gorton Duplicator & Vert. Miller (2)
12"x24" G. & L. No. 45 Surface Grinder, '42
No. 70A Heald Internal Grinder, 1942
Gear Cutter, No. 13 B. & S., spur & bevel
30"x120" cen. Axelson Lathe, T.A.
30"x120" Hanchett Plano Surface Grinder
3" Univ. Table Mill, 40" vert., 72" hor., '43
36" Bullard Spiral, 3 motor Hi-speed
No. 2 Stand. K. & T. Univ. Miller, Timken
Gear Gen., No. 61A Fellows, 1943
Gear Cutter, 3-36" B. & S. Spur, La'e
12"x48" Hanchett Vert. Spin. Surfac. Grinder
96"x96"x24' N.B.P. Planer
6' 17" col. Carlton Radial, M on arm
No. 254 Chicago Press Brake, 60" x 16 ga

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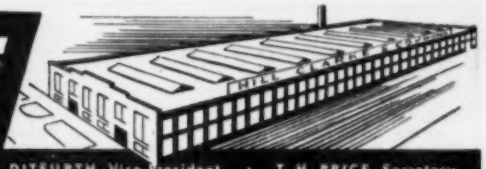

ESTABLISHED 1862 • H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary

AUTOMATICS

No. 6 Brown & Sharpe, M.D.
No. 49 New Britain, 4 Spdl. Chucker
Model A 3¼" Cleveland (1942)

DRILLS

No. 150 Baker, (1942)
No. D8 Colburn, No. 6 Morse Taper
No. 200—28" Defiance #5 Taper (1943)
No. 1-LMS Leland-Gifford (1942)
No. 2-LMS Leland-Gifford (1942)
No. 4-BM Fosdick 6 Spdl. (1942)
No. 4BL Natco 36 Spdl. (1943)
3'-10" American Triple Purpose, M.D.
4'-11" Carlton Radial Drill
5'-14" Fosdick
5' Western Heavy (1942)
6'-17" Fosdick Hyd. Economax Radial

GEAR MACHINES

No. 61-A Fellows Gear Shaper (1942)
No. 71-A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 72 Fellows Gear Shaper
No. 18H Gould & Eberhardt
72" Cincinnati Gear Cutter

BORING MACHINES

No. 31 Lucas 3" bar, M.D.
No. 2 Lambert 4" bar
No. 46-B Heald Bore-Matic (1942)
No. 112—C Excello 2 Spdl. (1942)
36" Bullard Hi-Speed (1942)
42" Bullard (1944)
60" Colburn, M.D.
72" Niles-Bement-Pond
84" Betts, M.D.

GRINDERS

3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
10"x96" Landis type C hydraulic (1942)
Norton Motorized Grinders ranging from 6"x18" 24"x240"
No. 34 Abrasive Surface Grinder (1943)
No. 23—18" Heald Rotary Surf.
No. 36-A Hanchett Rotary Surf. (1942)
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
Bryant Internal Grinders (1942)

LATHES

14"x30" centers Pratt & Whitney, Model C
16"x54" centers LeBlond (1941)
18"x8' American, Gdr. Head, M.D.
36"—48"x16' Lehman Hydratrol (1945)
8"x15" Sundstrand, Model D (1943)
10" Sundstrands, (1942, 1943)
18" & 28" Fay Automatics (1942)
Model R-14 Seneca Falls Lo-Swing
No. 3 Jones & Lamson Univ. Turret Lathe
No. 4 Gisholt Univ. Turret Lathe, (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Oliver (1942)
No. 5 Midland, Bar Feed (1942)
No. 1-H Libby, Extra Long Bed (1942)

MILLING MACHINES

No. 2H Milwaukee Plain (1942)
No. 3B Milwaukee Plain
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 2D Milwaukee Rotary Head Miller (1946)
No. 3 Cincinnati H.P. Vertical
No. 1-18 Cincinnati Mfg. (1942)
No. 2—18" Cincinnati Rise & Fall (1941)
No. 2—18" Sundstrand-Electromil (1942)
No. 2-24 Cincinnati
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex (1943)
No. 43-48 Cin. Hyd. Tracer (1941)
No. 56-72 Cincinnati Hydromatic
No. 56-90 Cincinnati Hydromatic
4½"x12" Pratt & Whit., Model C Thread Mill
6"x36" Lees-Bradner—Model HT (1943)
10"x48" Hanson-Whitney Thread (1942)
12"x24" H.T. Lees-Bradner (1942)
24"x24"x12' Ingersoll Adj. Rail Slab Miller
36"x24"x12' Ingersoll Duplex Miller (1946)
No. 10 Ingersoll 72"x8' Travelling Col. Fast Millers (1942)
No. 28-60 Cincinnati Hydrotel

MISCELLANEOUS

25" Smith & Mills Shaper (1946)
18" Dill Slotter
Micromatic Vertical & Horizontal Hydrohoners

PLANERS

36"x36"x12' Cincinnati
36"x36"x18' Gray Maxi Service, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

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G & L and Universal 3" Bar Horiz. Boring Mills
Campbell 6" Cap. M.D. Abrasive Cut-Off Mach.
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20" All Grd. Camel Back Drill
Cin.-Bick 3' & Morris 5½' Arm Radial Drills
Do-All 8 x 24" Horiz. Sp. Hyd. Surface Grinder
Blanchard M.D. Vert. Sp. Surface Grinder 20" chuck
L & S 28" x 8', 18" x 12', 20" x 10', 28" x 12'
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B & S Nos. 2-B & 3-B, Cin. No. 3 Mil, No. 2-B & 3-B, Cin. No. 5 LeBlond No. 4, Grd. Hd. Plain Millers
B & S No. 2-A & 3-A, Mil, No. 2-B, Cin. No. 1-M, Cin. No. 2 Grd. Hd. Univ. Millers
Avey 2-Spindle MAG Drill Press late.
Niagara 12' Power Square Shear, 10-Ga. 18" gap late
Cin. #3 Vert. Miller Late
Cin. 24" M.D. Univ. Shaper.
Cleveland 48" x 12' Table Open-side Planer, 3 Hds.

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American 20" Oil Extractor.
B & S Auto. Rod Magazine Feeds, M. D.

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72" x 72" x 30' INGERSOLL Adjustable Rail, Late Type, 2-Rail heads, 2-side heads. Table work surface 64" x 30'. Bed length 60'. Spindle speeds, R.H. Vertical RPM 12 to 480, all others 12 to 240. Maximum between horizontal spindles 72". Quill diameter 10" adjustment 15". Approximate weight 165,000 lbs. Inspect at Albany.

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Fisher, 5" Bar Floor Type Horizontal Boring Mill, AC-DC Drive
Gorton 3L—Three Dimensional Pantograph with Cutter Grinder
Bliss O.B.I. & Double Crank Presses
U. S. Tool Nos. 22, 25, 33 Multi-Slides
NILSON & BAIRD FOURSLIDES

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

New Britain Gridley #61 automatic screw machine 1⅝" capacity, 6 spindle, threading, chip conveyor, tooling, 1942.
Cincinnati #3 plain horizontal miller, dial type, vertical attachment, 1944.
Cincinnati #1-18 production miller, 1942.
Hanson Whitney 10x48 thread miller, 1941.
De Walt #ME2T tube cutter, 1942.
Grant #120A rivet spinner.
Gleason #6 universal gear tester, 1942.
Colonial 3 ton vertical hydraulic broach, 18" stroke, 1942.

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PRESS—#78C Niagara Double Crank, 85 Ton cap.
SHEAR—10'x3/16" Dreis & Krump All Steel Squaring
TURRET LATHE—#3 Gisholt Univ., Chuck, 1941

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Reid Bros. "Small Piece" Prod. Lathe, 9" Swing x 24" between Centers. (1943)
Jones & Lamson Auto. Internal Thread Grinder, Cap. 6" x 3", & M. D. and Controls, including separate Coolant Tank. (1945)
Landis 10" x 36" Model C. Hyd. Grinder. (1935)
Lees-Bradner Model No. 40 Thread Miller. (1942)
Jones & Lamson Internal Thread Auto. Grinder, 6" Swing 3" travel with motor generator set. (1942)
Amco #7 Planer 2½' x 5'. (1941)
Johnson Band Saw—Model J. (1945)
Jones & Lamson External Thread Auto. Grinder, 9" Swing 30" Travel. (1943)
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GRINDER—DISC, Besly 218 Opp. Type 23"
LATHE—AUTOMATIC, Gisholt #12 Hydraulic
LATHE—VERTICAL TURRET, Bullard 36" Late
MULTAUMATIC, Bullard 16" 8-Spindle Std.

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WA 5-0800

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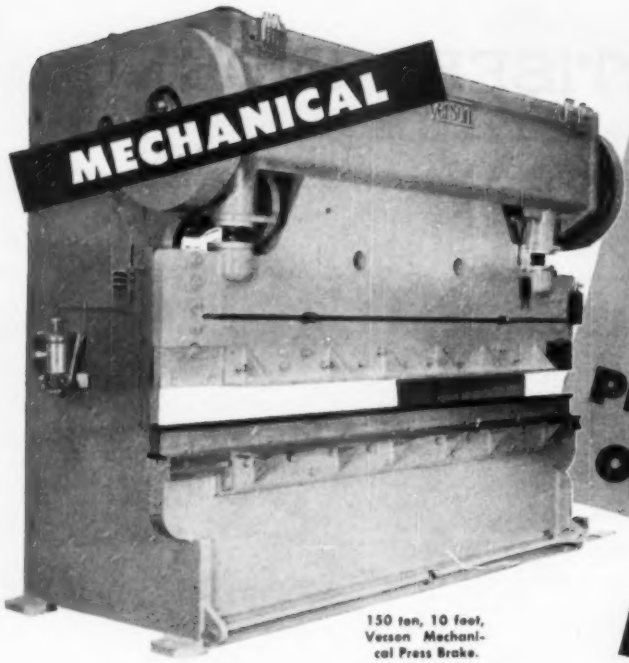
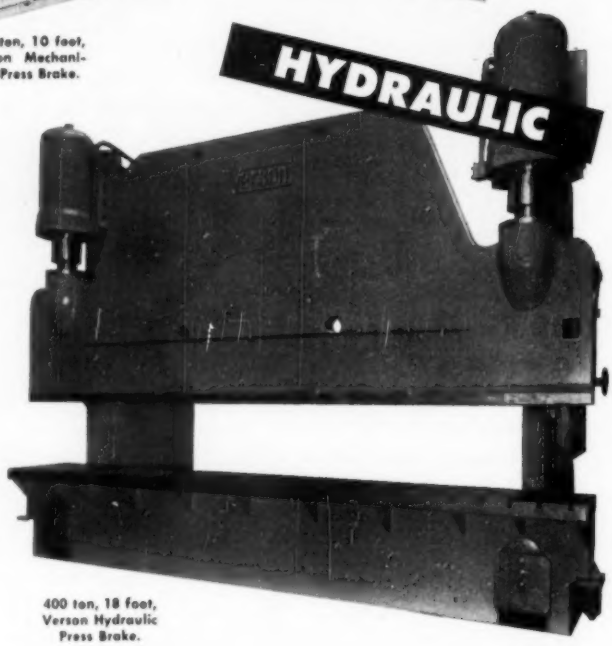


150 ton, 10 foot, Verson Mechanical Press Brake.

Verson Gives You a Choice in Press Brake Operation

As a manufacturer of both mechanical and hydraulic press brakes Verson can appraise your press brake requirements without prejudice—and recommend the method of operation best suited to your needs. All Verson Press Brakes, regardless of method of operation, offer outstanding design and construction that make them the leaders. From the small 16-48 brake to the heavy Majors, Verson Press Brakes are built to do their jobs better, faster and more economically.

If you have a job involving the forming, bending, coping, punching or notching of metal, we would welcome the opportunity to go over your requirements with you. Literature describing Verson Junior, Intermediate, and Major Press Brakes and Verson's complete line of press brake dies and punching attachments is available. Write for copies of those in which you are interested.



400 ton, 18 foot, Verson Hydraulic Press Brake.

Originators and Pioneers of Allsteel Stamping Press Construction

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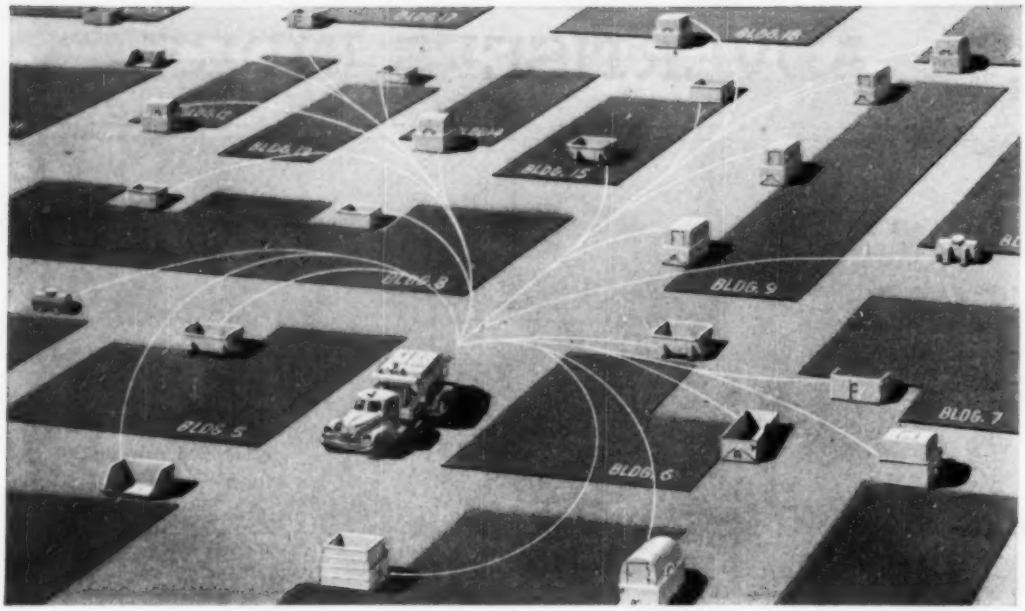


★ Never Before Have You Been Able To Cut Bulk Materials Handling Costs So Drastically

Pictured above is a skeleton layout of a typical industrial plant using the Dempster-Dumpster System — one truck mounted Dempster-Dumpster handles the entire group of 26 Dempster-Dumpster containers of six different types. These big, detachable steel containers are like having 26 truck bodies for a single truck.

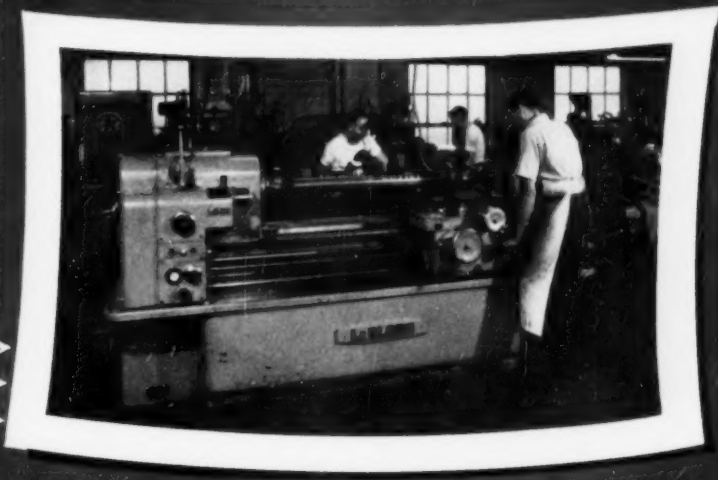
Any required number of Dempster-Dumpster containers are spotted at convenient materials accumulation points inside and outside your plant. They range in sizes up to 10 cu. yds. and are made in various designs to suit your particular needs. Materials — bulky, light, heavy, solids, rubbish and even liquids—are dumped or placed in these containers. The truck mounted Dempster-Dumpster makes scheduled rounds, picks up each preloaded container, carries it to the point of disposal, sets it down intact or dumps the materials and returns the container for refilling. The entire operation is hydraulically controlled and handled by only one man, the driver.

It is not unusual for one Dempster-Dumpster to eliminate up to 10 conventional trucks . . . reducing investment accordingly. This means cutting maintenance costs, tire and gas requirements tremendously. And, more important, it increases production with a minimum of manpower. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

Above, the Dempster-Dumpster is shown in the three simple stages of picking-up, hauling and dumping an 8 cu. yd. drop bottom container . . . completing the cycle in one to two minutes. These photos show the ease with which the Dempster-Dumpster handles all containers, regardless of their type, size or whether they are bottom or tilt dumping types.

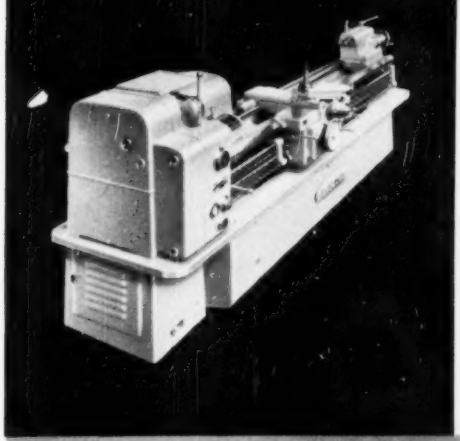
The important feature to remember is that only one truck-mounted Dempster-Dumpster and driver handles one container after another in an endless cycle, constantly on the move for economy and efficiency never before available in bulk materials handling.

DEMPSTER BROTHERS, 450 Dempster Building, Knoxville 17, Tennessee



• SHOP-TESTING
TAKES THE GUESS WORK
OUT OF BUYING A
LeBLOND "FIRST"...

...the 16" model RT-Heavy Duty Engine Lathe



The original 16" LeBlond Model RT Heavy Duty Engine Lathe shown in photo above, the first of a new line, held no uncertainties for the customer who bought it after only a brief demonstration. The years of intensive shop-testing that preceded the introduction of the RT, eliminated all guess work and made the customer's decision easy. Current model RT—shown in photo at left—is completely described in bulletin HD-30-A. Write today for your copy.

LeBLOND

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO, U.S.A.

LARGEST MANUFACTURER OF A COMPLETE LINE OF SHOP-TESTED LATHES.

SALES OFFICES: NEW YORK, CHICAGO, DETROIT

the LeBlond Plant at Cincinnati

shown at right . . . offers 10 acres of unique and identical facilities for building and testing a complete line of lathes. This unusual and interesting product research program is described in a colorful brochure. Write for your copy today.

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